

MEDICAL REPORT regarding LUCY CRAWFORD (Deceased)

Strictly Private and Confidential

Date of birth: 05.11.1998

Date of report: 6.02.2004

Date of death: 14.04.2000

This report is based on material made available including hospital notes relating to admission of this child to Erne Hospital in November 1999 and April 2000. The first admission was for bronchiolitis and is not directly relevant to the problems which occurred during the subsequent admission in April 2000. At that time Lucy was admitted to hospital with a history of fever and vomiting for 36 hours associated with drowsiness for 12 hours. There was no history of cough and her chest was clear on examination. The history and clinical findings had been thought by the GP to suggest urinary tract infection but it was felt on admission that this was more likely to be a viral illness. Initial blood tests were performed and Dr Malik attempted to commence IV fluids but was unable to do so and so called Dr O'Donohoe (the Consultant Paediatrician). IV fluids were then commenced. The nursing notes record observations at 19.30, 22.30 and 23.30 during which time the high temperature gradually came down to 37.4.

There is then a gap in the observation sheet with no apparent entry until an episode of sudden collapse which occurred around 3.00 am. It appears that mother called nursing staff as Lucy had passed diarrhoea and then become rigid. Dr Malik was called and felt that this could be a febrile convulsion so administered Diazepam. He discussed the case with Dr O'Donohoe who then came directly to hospital arriving at 3.20 am. At around this time Lucy's condition further deteriorated as she stopped breathing and required respiratory support. The on-call Anaesthetist was called at 3.40 am and Dr Auterson arrived shortly after 3.50 am and assisted with the resuscitation including intubation and transfer to the Intensive Care Unit prior to stabilisation and transfer to the Paediatric Intensive Care Unit in the Royal Belfast Hospital for Sick Children later on the same morning. The doctors involved seem clear that there was no episode of cardiac arrest or circulatory instability during this period but it was noted that the pupils became fixed and dilated and did not respond to ventilation or the administration of Mannitol.

Subsequently tests in Belfast revealed evidence of brain stem death and post mortem examination was performed. This showed bronchopneumonia and cerebral oedema with evidence of herniation of the brain. The Pathologist is unable to comment as to whether the bronchopneumonia had been present from admission to Erne Hospital or had occurred in association with the collapse and resuscitation. Further specimens have shown rotavirus infection suggesting that the initial admission was likely to be due to rotavirus gastroenteritis. Urine cultures showed no significant growth.

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Comment

This child's admission to Erne Hospital was very typical of gastroenteritis in this age group. This is often associated with high temperature and vomiting with or without diarrhoea and young children can become very unwell. The standard treatment is to administer fluids either orally or (if there is significant dehydration or vomiting) by the intravenous route. The solution used is one which is commonly used in Paediatric practice to provide **maintenance** fluids in these circumstances as it replaces small amounts of electrolytes but also gives Dextrose which is required by young children who are unable to take calories orally during the acute phase of the illness. Initial physical findings were suggestive of poor peripheral circulation with delayed capillary refill time >2 seconds. The GP noted that the mucosae were moist but there is little specific detail in the admission note regarding evidence of dehydration. However, the urea was 9.9 which is slightly elevated suggesting a mild degree of dehydration but with normal electrolytes at that time. This would again be very typical of the condition and would not normally indicate anything other than appropriate fluid replacement with careful monitoring and nursing observation. However, in this situation the intravenous fluids for **replacement of any losses** should contain a higher content of sodium (eg "normal saline" - 0.9% NaCl - sodium chloride).

In these circumstances it is always very difficult to understand an episode of sudden collapse. Sudden onset of convulsions is most commonly due to high temperature in young children and this was considered. However, the features were not typical and the temperature had in fact improved since admission. It is unclear as to what alternative diagnoses were considered at this time but the blood test for electrolytes was appropriately repeated immediately. This showed a significant fall in sodium from 137 to 127 and in potassium from 4.1 to 2.5, together with an increase in glucose from 4.5 to 10.9. These changes do raise the question as to the fluid management in the period from insertion of the IV line at 23.00 to the collapse at around 3.00 am. Unfortunately there appears to have been confusion between the staff involved as to the fluid regime ordered by the Consultant. In addition it is difficult to interpret the records made by nurses on the fluid balance chart and no totals have been calculated for this period. It will be most important to determine from the staff involved **exactly how much of each type of fluid** was given at each stage throughout this time period, and following the change of fluids to normal saline through until the child arrived in the Paediatric Intensive Care Unit in Belfast.

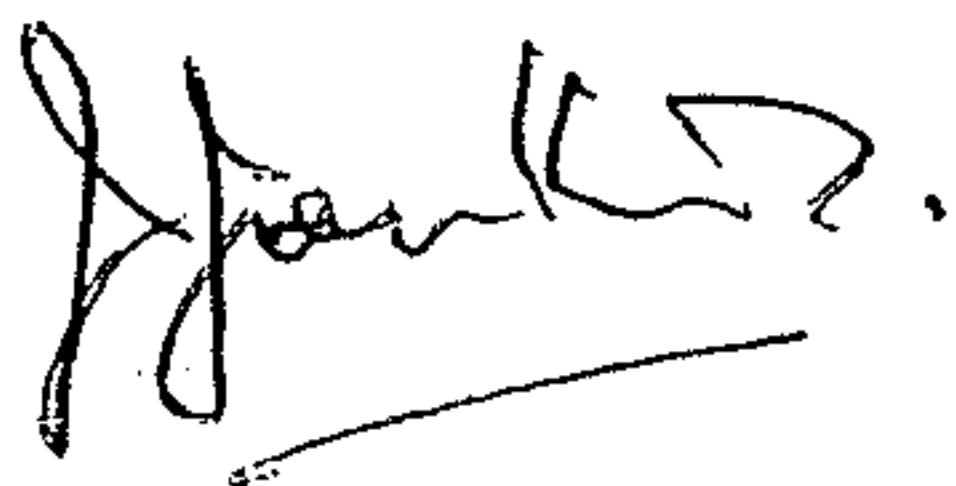
Other aspects of this tragic case demonstrate a rapid and effective response by the medical staff concerned. In particular both the Consultant Paediatrician and Consultant Anaesthetist appear to have been available within a very short time period of being called and to have done their best in the difficult circumstances involved in caring for a child of this age in an adult intensive care setting for stabilisation and transfer in the absence of a Paediatric transfer service in Northern Ireland.

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Over recent years concerns have increasingly been expressed regarding the use of 0.18% saline in Dextrose as a standard solution for intravenous use in young children, and a number of cases of symptomatic hyponatraemia have been identified, some resulting in death or cerebral damage. It has been suggested that a more appropriate solution would contain a higher level of sodium and this has recently been the subject of discussions involving the Department of Health, Social Services and Public Safety and production of guidelines. However, it must be emphasised that this is a recent development and that at the time of Lucy's admission to hospital many Paediatric Units were continuing to use the solution which was initially given in this case. Although the sodium level of 127 is not in itself usually associated with severe problems, it is likely to be the rate at which the sodium falls rather than the absolute level which can cause problems in this setting.

While no definite conclusions can be drawn regarding the cause of this child's deterioration and subsequent death, there is certainly a suggestion that this was associated with a rapid fall in sodium associated with intravenous fluid administration causing hyponatraemia and cerebral oedema. In these circumstances clear documentation is needed regarding the fluid type and rate prescribed, together with clear records as to the exact volumes of each fluid which were in fact received by the child throughout the time period concerned.



Dr J G Jenkins MD FRCP FRCPCH FRCPI
Senior Lecturer in Child Health and Consultant Paediatrician

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MEDICOLEGAL REPORT

ON

LUCY CRAWFORD

Deceased

dob: 5th November 1998

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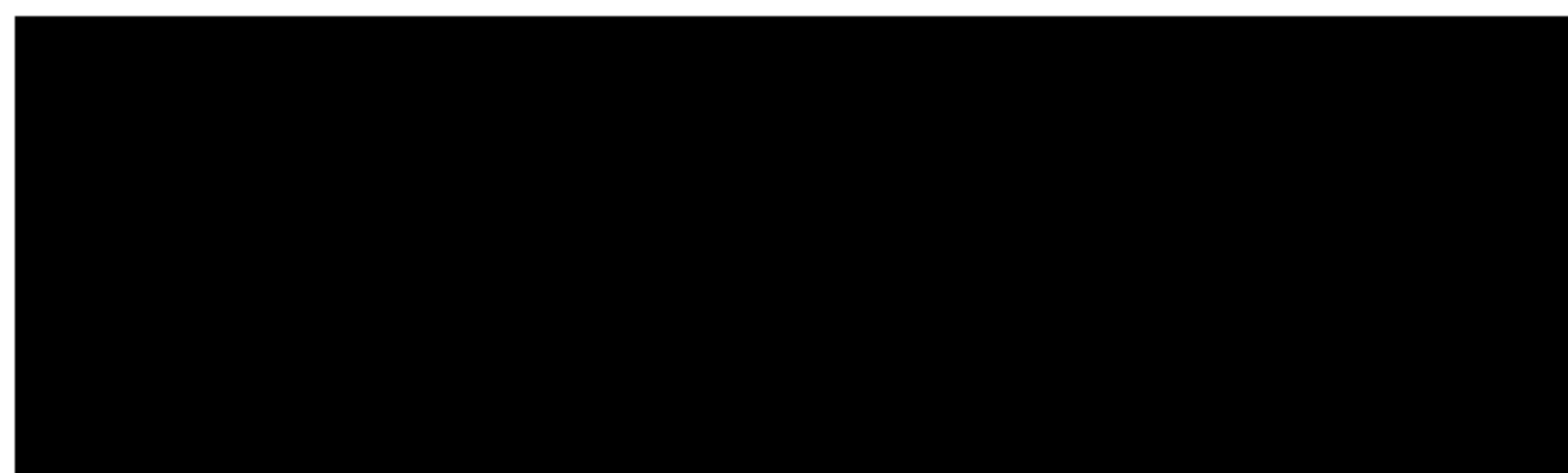
Died: ~~13~~¹⁴ April 2000

Prepared for:

John L Leckey LL.M
HM Coroner
Coroner's Office
Courthouse
Old Town Hall Building
80 Victoria Street
Belfast BT1 3GL

By:

Edward Sumner MA, BM, BCh, FRCA
Consultant Paediatric Anaesthetist



April 2002

My name is Edward Sumner and I am a consultant in Paediatric Anaesthesia with an interest in Intensive Care.

I was consultant at the Great Ormond Street Hospital for Children, London, from 1973 until June last year. I am the author of several textbooks on the subject and am the Editor-in-Chief of the Journal, *Paediatric Anaesthesia*.

Currently, I am the President of the Association of Paediatric Anaesthetists of Great Britain and Ireland.

In the preparation of this report I have carefully perused all the medical and nursing notes presented to me by the Erne Hospital, Enniskillen, Northern Ireland.

I understand that my overriding duty is to the Court on matters which are within my expertise. I also believe that the facts I have stated in this report are true and that the opinions I have expressed are correct.

Lucy was born by planned caesarian section for maternal reasons on 5th November 1998, weighing 7lb 2oz. She progressed normally, though she required hospitalisation for 2 days from 18th November 1999 with bronchiolitis caused by Respiratory Syncytial Virus (RSV), but recovered from that.

On 12th April 2000 at 7 30 pm Lucy was again admitted to hospital with a history of being off her food for 5 days, fever and vomiting for 36 hours and being drowsy for the previous twelve hours or so. The history suggests that she vomited everything she had eaten or drunk. At that time Lucy was 17 months old and weighed 9.1kg. She was up-to-date with all her immunisations.

On examination she was found to have a fever of 38 °C, heart rate of 140 per min and a respiratory rate of 44 per minute.

Capillary refill was greater than 2 seconds, but her tongue was moist. She was noted to be conscious and pink.

A viral illness was diagnosed.

Urine analysis showed ketones ++ and protein ++ (++++in the nurses notes) Blood analysis showed Hb 12.1, white cells 15, sodium 137, potassium 4.1, CO₂ 16 (low) and urea 9.9 (high). Blood was also taken for blood cultures and it was decided to provide intravenous fluids after venous cannulation.

Anaesthetic cream (Ametop) was applied at 7 30 pm, though Dr Malik was unable to cannulate a vein, but Dr O'Donohoe achieved cannulation in the left hand at around 10 pm and IV fluids were commenced at 1030 at 100ml per hour of 4% dextrose/0.18% saline. The prescription chart for these fluids is page 65, but there is no note at which rate the medical staff wanted the fluids to run.

During the evening, Lucy had taken some sips of fluid and some of this had been tolerated.

The Intake/Output chart on page 64 suggests that 50ml of juice and 100ml Dioralyte had been given orally. She continued to be drowsy and lethargic. Paracetamol 120mg was given at 10pm. It is noted that she vomited at midnight (++) and at 2 30 am she passed a large, runny bowel motion and because of the fear of cross-infection, Lucy was moved into a side room and a stool sample was sent for bacteriological examination (rotavirus was subsequently cultured)

IV fluids were maintained at 100ml per hour of the no 18 solution.

At 2 55 am the nurses were called by Mrs Crawford because Lucy had become rigid in her arms. Dr Malik was called. At that time there was no loss of colour, no cyanosis and the pulse and breathing were satisfactory. Oxygen therapy was commenced. Dr Malik ordered diazepam (2.5mg) to be given rectally, but this provoked a large watery offensive stool. Dr O'Donohoe was also present. At that time the blood pressure was 144/113 and the pulse rate 160; blood sugar was 13.4 mmol. The intravenous fluids were changed to 0.9% saline and allowed to run in freely – 500ml were given over one hour. Serum electrolytes at the time were: sodium 127, potassium 2.5.

By 3 20 am, there was decreased respiratory effort – an oral airway was inserted and Dr Malik began to “bag” Lucy. At this stage the pupils had become dilated and unresponsive.

Dr O'Donohoe had 2 unsuccessful attempts at tracheal intubation, but this was eventually achieved with a size 4 oral tube by the anaesthetist, Dr Anterson.

At 4pm the benzodiazepine antagonist, Flumazenil 100ug IV was given.

Oxygen saturations were always maintained between 85 and 100% during this period of time. A urinary catheter was inserted and a small amount of clear urine drained. Lucy was then transferred to the ICU at around 5 am to be transferred later to the Children's Hospital, Belfast.

Mannitol 5g, to reduced cerebral swelling was given IV over 30 minutes.

In a note written on 14th April 2000 after Lucy's death, Dr O'Donohoe states it was his recollection that the fluids had been NaCl 0.18%, dextrose 4% and had been given as a bolus of 100ml and then at a rate of 30 ml per hour after that. He worked out a maintenance fluid protocol at approx 30ml per hour for the transfer. Dr Anterson had suggested 40ml per hour.

Lucy arrived in the PICU in Belfast at 7 45 in the morning of the 13th April, completely unresponsive. Brainstem tests performed at 8 45 and 10 30 am were negative, CT scan showed complete obliteration of the basal cisterns and the electroencephalogram was flat.

She was taken off the ventilator and extubated at 1pm and died shortly after that.

The clinical diagnosis at the time was said to be dehydration and hyponatraemia; cerebral oedema, acute coning and brain stem death.

At postmortem, Lucy weighed 12kg. The lungs were considerably congested and oedematous, especially on the right with well developed bronchopneumonia.

The brain showed features of generalised cerebral oedema with evidence of mild uncal herniation and some grooving in the tonsillar regions.

I would like to make the following comments:

The evidence is that Lucy, a previously healthy little girl died of acute cerebral swelling leading to "coning", the process in which intracranial pressure rises to such a degree that the base of the brain is forced down into the foramen magnum with subsequent brain death.

On admission, Lucy weighed 9.1kg and at post-mortem examination, 12kg and even though inaccuracies do occur in weighing children, she had gained a great deal of weight during her brief hospitalisation – somewhere in the region of 2kg – equivalent to 2 litres of water.

Her circulating blood volume was approximately 700ml. (Approx 80ml/kg body weight)

It is difficult to judge exactly how dehydrated Lucy was on admission to hospital. A capillary refill time in excess of 2 seconds is one sign of approximately 5% dehydration, however, this sign is likely to be hard to interpret in a febrile child. At this level of dehydration, mucous membranes are dry, but it was noted that Lucy's tongue was moist. I think, on balance that she was mildly dehydrated – perhaps somewhat less than 5% and involving a fluid deficit of approximately 350ml.

Lucy's symptoms before hospitalisation were lassitude, fever and vomiting; the diarrhoea came later during her time in hospital. Vomiting causes a severe loss of both water and electrolytes. Sodium and acid are lost from the stomach in the vomiting and as a compensatory mechanism the kidneys in trying to conserve sodium allow a net loss of potassium.

Intravenous fluid therapy in this situation is aimed at restoring the calculated deficit, replacing ongoing losses and providing normal maintenance fluids while gastrointestinal function is deranged.

It is common, and good practice in this clinical situation to make a formal assessment of the degree of dehydration, to note the physical signs and then to write down the calculations for prospective intravenous fluid management. This was only done retrospectively after Lucy's death.

What is **absolutely mandatory** is to write a proper fluid prescription on a designated chart stating which fluid is to be given and **at what rate**. This was not done. Dr O'Donohoe thought Lucy was having 30ml per hour of dextrose/saline, but in fact she was having 100ml per hour.

The Intravenous Chart on page 65 must be rather old fashioned since it gives details of subcutaneous fluid administration – a practice abandoned decades ago.

Four percent dextrose/ 0.18% saline is a totally inappropriate fluid to make up deficits from vomiting and diarrhoea. The dextrose is immediately metabolised and so this solution is effectively providing only water.

An appropriate fluid would be normal (0.9%) saline with a potassium supplement (eg 10mmol in 500ml), Hartmann's or lactated Ringer's solutions. This could have been as an initial bolus of 100-150ml over the first hour, to cover approximately half the calculated deficit, then the rest of the deficit plus normal maintenance fluids could be given over the next 12-24 hours. The deficit by this stage would be approximately 200ml (8ml per hour) plus normal maintenance of 5ml per kg per hour – a total of approx 50ml per hour, most of which should be saline, though some could be a dextrose containing solution.

Additionally, on-going losses from vomiting and diarrhoea should be replaced by an equal volume of normal (0.9%) saline plus potassium.

In the event, Lucy was given only 4% dextrose/0.18% saline in a volume of 400ml from 1030 pm to 3pm when she became acutely unwell with what was probably a seizure.

Hyponatraemia is defined as a serum sodium level of less than 128mmol.l^{-1} . The second measured sodium level was 127mmol.l^{-1} , within that definition, but representing a rapid and dramatic fall from the first level measured at 8 50 pm (137mmol.l^{-1})

It is not clear from the notes exactly what time the second set of electrolytes was taken – the laboratory printout is not timed. At some time during this period the fluids had been changed from dextrose/saline to normal (0.9%) saline and a very large volume (500ml) given. This volume of saline represents 70% of the circulating blood volume. It is possible that the serum sodium had been lower, but increased during the administration of this huge volume of saline.

The dilution of the serum electrolytes by an excess administration of water is clearly shown by the acute reduction in the serum potassium from 4.1 to 2.5mmol.l^{-1} .

It is also possible that Lucy produced inappropriate Antidiuretic Hormone (ADH) which causes retention of water in the body and is secreted in times of stress and infection.

The tendency to oedema from an excess of administered water would be exacerbated by the vast over infusion of saline at the time of resuscitation.

It is known that an acute reduction in serum sodium by the administration of excess fluids with a low sodium content leads to cerebral oedema by an osmotic effect – the child's brain is particularly sensitive and this is well documented in the medical literature.

Although the skull is a rigid structure, as the brain swells, the intracranial pressure does not rise at once because CSF and blood are displaced from the cranium, but when this mechanism can no longer cope, then the pressure within the skull rises rapidly and the brain is forced down into the foramen magnum – a situation known as “coning”. At this stage there would be seizures and vomiting with the rise in intracranial pressure followed by changes to the pupils which become dilated and unresponsive, loss of consciousness and cessation of breathing. Blood pressure is often high at this stage. Brain death follows if steps to reduce the cerebral swelling are not taken immediately, as the intracranial pressure exceeds that of the blood supply.

Lucy's clinical course vividly illustrates this sequence of events.

To conclude and summarise, I believe that Lucy died of acute cerebral oedema leading to “coning” - the forcing of the brainstem down into the foramen magnum in the base of the skull.

She came into hospital somewhat dehydrated from vomiting which causes a loss of water and sodium chloride. There was additional loss from diarrhoea.

She was given an excess volume of intravenous water to replace these losses. I think that the excessive volumes of dextrose/saline (4%/0.18%) in the face of losses of electrolytes from vomiting and diarrhoea caused an acute serum sodium dilution which in turn caused acute brain swelling.

The brain swelling starts insidiously until intracranial compensatory mechanisms cannot cope, at which time intracranial pressure suddenly rises and the coning process begins. This is manifest by seizures, loss of consciousness, the pupils become dilated and unresponsive and there is cessation of respiration.

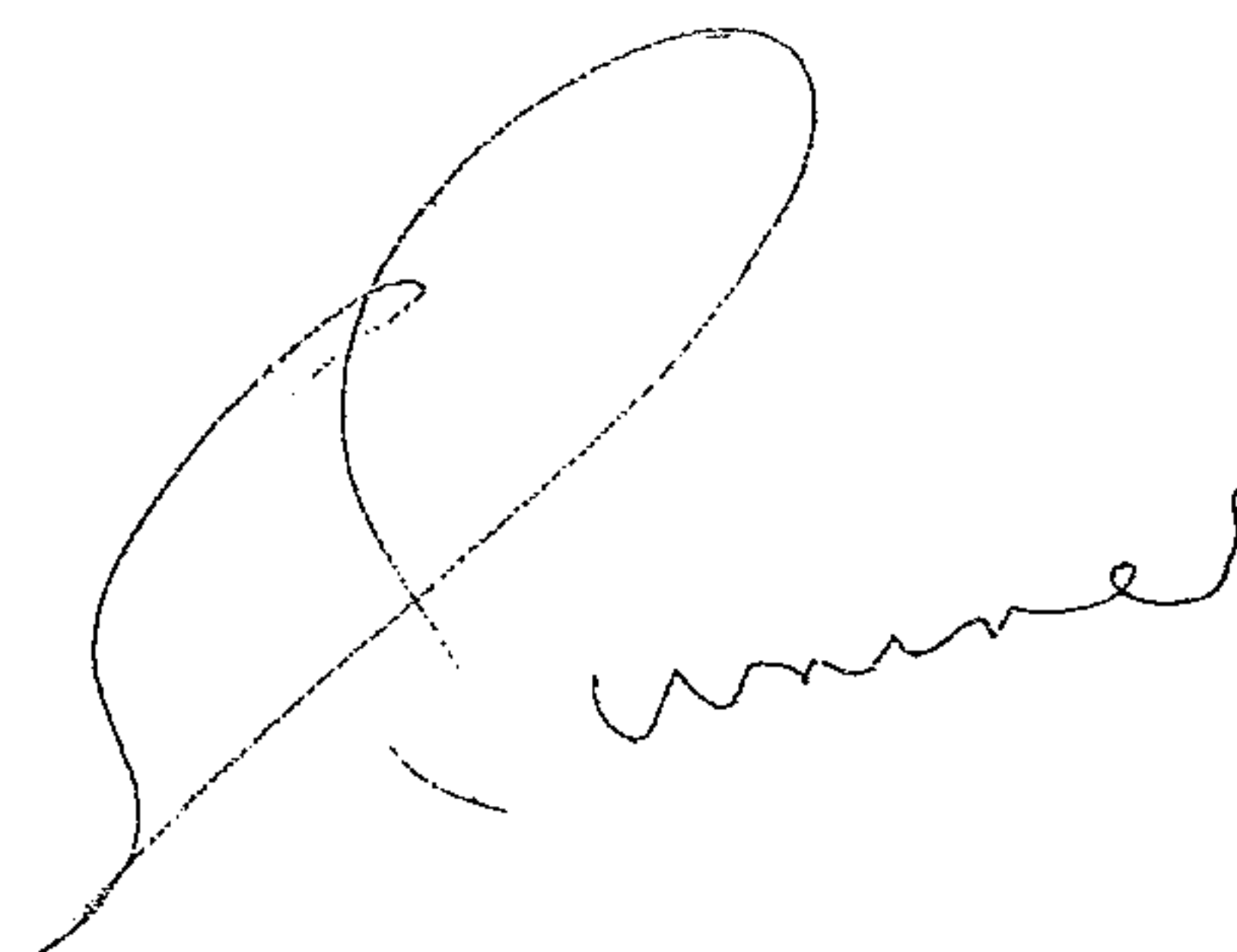
I think the cerebral oedema was exacerbated by the huge volume of saline given at the time of resuscitation.

exacerbated by excess administration of saline.

References.

Huskinson L Fluid balance: all aspects. In: Paediatric Anaesthesia. Eds: Sumner E, Hatch DJ. London Arnold 1999

Arieff AI. Postoperative hyponatraemic encephalopathy following elective surgery in children. Paediatric Anaesthesia 1998; 8: 1-4



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18.2.2001

My Ref: Leg2000 / Crawford / B.34
Your Ref: K2/E/2281
Enquiries to: Mrs H W Williams

Re: Lucy Crawford, d.o.b. 5.11.98

1. This report is prepared at the request of Murnaghan & Fee Solicitors, 37 Townhall Street, Enniskillen, Co Fermanagh, Northern Ireland.

2. I have received the following documents.

- i. Copy of medical notes from Erne Hospital;
- ii. Copy of medical notes and letters from the Belfast Royal Victoria Hospital;
- iii. A copy of the post mortem report and death certificate;
- iv. Copy of the GP notes and records;
- v. Copy of the hand written history prepared by Mr and Mrs Crawford, Lucy's parents.

3. My instruction is to look at the events leading to the death of Lucy Crawford. She was admitted to Erne Hospital. Her condition deteriorated. She was transferred to the Royal Victoria Hospital in Belfast. Sadly, the medical staff were unable to treat her condition successfully and she died.

4. The next few paragraphs summarise Lucy's medical history. I have numbered the pages, 1-100. There is some duplication. The numbers in brackets relate to my numbering system.

Summary from the notes of Mr and Mrs Crawford

5. The main points from the parents' history, according to time and date, are as follows.

10.4.2000		Lucy cared by baby minder. All well.
11.4.2000	8:45am	Went to baby minder.
	11.15am	Lucy vomited.
	12:00noon	Collected Lucy and went home.

	13:00hr	Made appointment with Dr Graham (presumably the GP)
	14:40hr	Lucy seen by Dr Graham. <i>"nothing to worry about"</i> . Returned home.
12.4.2000	07:45am	Lucy <i>"...seemed reasonable"</i> . Mother went to work. Father stayed with Lucy.
	13:00hr	Return from work. Lucy was in the sitting room. Given Calpol.
	18:00hr	Temperature 100°F. Given spoonful of Calpol.
	18:45hr	Took Lucy to Dr Kirby. Dr Kirby advised that Lucy should be admitted to hospital.
	19:15hr	Went to hospital.

6. Lucy was admitted to the Children's Ward, Erne Hospital at 7:20pm on 12.4.2000 (3). Dr Malik saw her. Lucy was weighed and a urine bag attached. Mother told of the probability of gastroenteritis. Lucy had no history of diarrhoea. There was no family contact of gastroenteritis. Temperature 39.2°C. Dr Malik tried to locate a vein for an intravenous infusion. He tried *"...at least eleven times."*

7. At 8:50pm, Dr O'Donoghue saw Lucy. He placed more cream on her hand (this would be analgesic cream, to reduce the pain of intravenous access). He obtained IV access at 10:30pm. At 11:30pm, Mrs Crawford felt that there was no response from Lucy to the arrival of her sister. Her eyes were staring. Lucy vomited at 12:15am (Thursday, 13.4.2000). At 2:15am, Lucy had a bowel action that was *"...runny, green and foul smelling..."*. At 03:00am, Mrs Crawford notes that Lucy *"...moaned a little, she started to breathe loudly for 3-4 breaths, her body twitched, eyes were flickering, her body rigid, her hands I noticed were clenching backwards and tight fisted"*. Lucy did not respond to her mother. Nurses gave Lucy oxygen. Dr Malik, Dr O'Donoghue and Dr Otherson came to see Lucy. (I think that Dr Otherson is an anaesthetist). Lucy was moved to the intensive care ward at 03:35am. At about 5:30am, parents were told by a nurse that Lucy had been stabilised and she was transferred to the Royal Victoria Hospital in Belfast. The ambulance left with Dr O'Donoghue at 6:45am on Thursday 13.4.00.

8. Mr Crawford has also provided a very careful summary of events. He confirms that he went home at 23:50hr on 12.4.2000. The final part of Mr Crawford's account (pages 10-

11), records that Mr Crawford was telephoned at home as Lucy had taken a slight turn [Mr Crawford noted the time to be 14:50 but I wonder whether the time is actually 02:50, i.e. 2:50am and not 2:50pm]. He records that he arrives at the ward at 15:20 [or, more probably 03:20. This would appear to be the correct time to tally with Mrs Crawford's account]. Mr Crawford accompanied Lucy's transfer by ambulance to the Royal Victoria, Belfast at 06:30hr. Her condition did not change and he was told that the medical staff proposed carrying out brain stem tests the following day, Friday. These are tests carried out when a patient is deemed incapable of independent survival, i.e "brain dead".

The GP notes

9. The only GP entry relating to the index event is dated **11.4.00** (12). It notes "*history of vomiting and increased temperature, no diarrhoea. On examination, temperature 37.8 °C. Slightly dehydrated. Abdomen ✓ ? Viral gastritis, advised re fluids and Calpol*".
10. The out of hours service records the following information. A call received on **12.4.2000** at 18:38hr (19) records a message that Lucy had been "*unwell all weekend – vomited yesterday and today – spiking temperature – breathing quite fast – has slept all day.*" It records that Dr Kirby saw the child at 19:25hr and the final message confirms that Lucy was admitted to hospital, the time was recorded at 19:46hr. The examination findings were noted as
Respiratory rate 60pm, temperature 38°, pulse rate 120pm. No localising signs. Admit children's ward".

Erne Hospital; Medical Notes

11. Lucy's previous hospital admission was on **18.11.99**. She presented with typical features of bronchiolitis. The RSV (respiratory syncytial virus) test was positive. She was allowed home on 19.11.99 (22-23).
12. The GP referral letter of **12.4.00** confirms that the reason for referral was "*pyrexia – not responding to Calpol*". Lucy was recorded as being "*drowsy and lethargic, floppy, not drinking*". Examination showed a temperature of 38°C. The mucosa was moist. Ears, throat,

heart, chest and abdomen were normal. The impression of the GP was suspected u.t.i (urinary tract infection).

13. The admission note (31) records that the history was of Lucy not feeding as well for 5 days. She had been running a fever since the day before and had vomited everything she eats or drinks. Over the past twelve hours she had been very sleepy.

14. The clinical examination (bottom of page 32) notes that Lucy has a raised temperature of 38°C. The respiratory rate is 40pm and the heart rate 140pm. Weight is 9.14kg. The capillary refill time is over 2 seconds. No abnormality is found on examination of chest, heart and abdomen. There is no comment regarding blood pressure or degree of dehydration. The plan is to admit and observe and to encourage feeding. The investigations show the following.

Hb 12.1, WBC 15.0, neutrophils, 13.7, platelets 397 (all normal)

Sodium 137, potassium 4.1, chloride 105, urea 9.9, glucose 4.5, creatinine 95.

The electrolytes are normal. The urea is increased indicating a degree of dehydration (normal is 2.5-6.5, page 69). The rest of the investigations are normal. Interestingly, the urine is recorded as showing protein ++ in addition to ketones ++. There are no leucocytes. This means that there is no urine infection.

Intravenous line is inserted 23:00hrs. There is no entry regarding the fluids given.

15. The next entry (33) is timed at 03:15hr on 13.4.00. Dr O'Donoghue is called to assess Lucy's condition.

16. An entry timed 2:58am on 13.4.00 (35) records the events of the time. The entry notes

"Called to see Lucy who had a fit according to nurse. Respiratory rate 36/min, HR (heart rate) 140/min. Advised rectal diazepam as she was still twitching her hands.

3.15. Called Dr O'Donoghue to assess the patient.

3.20. Dr O'Donoghue came to see the patient had developed respiratory arrest and was making few respiratory efforts. Ambu bagging done, cardiac and pulse oximeter attached.

Passed large foul smelling stool. NaCl .9% 500 ml given over 60 minutes.

Anaesthetist called put in endotracheal tube. Pupils fixed and non responding to light. Heart rate above 100 during the whole time. BP 90/65 on average. Did not developed (sic) cyanosis. O₂ sat (saturation) 85 to 100%.

Catheterised (urinary)

4.45 Shifted Adult ICU, to be shifted to ICU Paed in RBHSC by Dr O'Donohue."

17. The entry timed 05:15hr, in another handwriting, notes that mother had noticed Lucy being rigid for 5 minutes at 03:00hr. There was also a history of diarrhoea. Oxygen saturation was 85-100%. Capillary refill time was less than 2 seconds, pulse was easily felt. Pupils were dilated and unresponsive. Repeat electrolyte investigations showed the following.

Sodium 127, potassium 2.8, urea 4.9, creatinine 28. A dextrostix level (a bedside method of checking glucose value) was 12.

Lucy was transferred to the ICU at 05:00hr, claforan, an antibiotic, was given, 1g IV immediately. She was also given mannitol 5g IV over 30 minutes.

18. A chest x-ray was recorded as showing nil abnormal. Abdominal x-ray was noted to query air in the colon and small intestine.

19. An entry dated **14.4.2000** comments on the query from the Royal Victoria Hospital regarding Lucy's fluid regime. The hand written entry is not particularly clear. It notes as if Lucy received 0.18% sodium chloride/dextrose 4% at 30ml per hour. [This is contrary to the fluid regime on the fluid chart]. She also apparently received a bolus of 100ml but the concentration of this fluid is not clear.

I am not quite certain of the total fluid volume that Lucy received in Erne Hospital. I am less certain that this was the volume she actually received. I suspect that she received more than this. From the fluid chart (42) I estimate that it is as follows: -

Oral	150 ml
0.18% NaCl	400 ml (100ml/hr from 11 pm until 3.00 am)
0.9% NaCl	500 ml (in 60 min)
<u>Total</u>	<u>1,050 ml</u>

20. An entry dated **18.4.00** (36) comments on 'Rota gastro-enteritis' Rotavirus is a common cause of gastro-enteritis in children.

Erne Hospital; Nursing Notes

21. The nursing progress note (39) confirms admission on 12.4.2000. Temperature was 39.2° at 8:40(pm). The entry timed at 20:30hr notes that IV fluid "...of No 18 solution commenced at 22:30hr at 100ml per hour, to encourage urinary output. Urine specimen was obtained at 21:00hr. IV fluids remained at 100ml per hour".

A large pale green stool was recorded at 02:30hr. The nursing entry records Lucy's collapse at 02:55hr.

22. The nursing observation sheet (46) contains information regarding Lucy's condition between 19:30hr on 12.4.2000 and 04:00hr the following morning. Her temperature is raised throughout, ranging from 38.7° down to 37.4° (normal 36.9°). The initial entry, 19:30hr, notes that Lucy is "floppy, slightly flushed". The BM (a bedside glucose estimation) is 3.6. This is at the lower end of the normal range. At 20:30hr she receives paracetamol 120mg pr. At 23:30hr she is noted to be asleep. Respiratory rate is a normal 26.

23. The first entry of heart rate is at 03:15hr where the value is 163. I think that the figure '144/113' indicates blood pressure. If so, it is a very abnormal raised value. There are no other recordings of blood pressure. The BM glucose value is now 13.6. The reference to the figure 98% is presumably the oxygen concentration.

24. The intravenous fluid chart records "SOL 18" IV (44). The daily fluid balance chart (42) records that Lucy receives 150ml of fluids orally at 09:00pm and 10:00pm (juice and dioralyte). From 11:00pm she receives intravenous fluids. The hourly entry is recorded as 100/100, 100/200, 100/200, 100/200 and finally 500. I am not quite clear whether this means that Lucy receives 100ml per hour of 0.18 NaCl.

Admission to Adult ICU

25. The assessment entry notes that Lucy is unconscious. The Glasgow coma scale (GCS) is 3. This is the lowest possible score and indicates no spontaneous reaction. The normal GCS is 15. Lucy is on ventilatory support at this time.

26. The evaluation at 4:35am records that she is on full ventilatory support. The oxygen saturation is 92-99%. BP 92/49 (normal). Heart rate 112. The pupils are fixed and dilated. Mannitol 20%, 25ml over 30 minutes, is prescribed as well as claforan, which is an antibiotic.
27. The nursing entry recorded at the time of Lucy's collapse (pages 46-47) describe features entirely consistent with a tonic clonic convulsion. Lucy is given diazepam pr. There is actually an entry recording a blood pressure of 144/113 at 03.15 hr (40). The blood glucose is 13.4. IV fluids are changed to 0.9% saline and "...run freely into IV line". Urinary catheter is passed and a small amount of urine is found. The rest of the charts from Erne Hospital ICU confirm the following. Hourly blood pressures are normal at 90/50. Pulse rate ranges from 110-100. Oxygen concentration is 91-100%. Total infusion in ICU is 310 of fluid (presumably 0.9% NaCl) plus 25ml of mannitol, giving a total 335ml (53). The entry on page 54 notes that dopamine was also given.

Medical Entries of the Royal Victoria Hospital, Belfast for Sick Children (RBH)

28. The front sheet (73) confirms that the diagnoses at the RBH were cerebral oedema and viral gastro-enteritis. Also, that a CT scan of the brain showed cerebral oedema and coning. The contemporaneous record notes that Lucy was very cold, 31°C. I cannot find a record of her weight on admission to Belfast. Neurological examination confirmed that the pupils were *'fixed and unresponsive'*.
29. An entry of 13.4.00 states *"CT today shows obliteration of the cisterns suggesting that she has coned. Reasonable white matter / grey matter differentiation seen, but her EEG shows isoelectric pattern."* The prognosis is considered *'hopeless'*. Two brain stem viability tests are *'negative'*. Treatment is discontinued and death is confirmed at 13.15 hr on 14.4.00.
30. The post mortem report (page 83 onwards) confirms that none of the investigations carried out to look for the cause of the gastro-enteritis isolated a specific organism. The only positive factor was the presence of an enterovirus PCR.
31. The general findings on post mortem showed that the body weighed 12kg and measured 73cm in length (85). There was evidence of congestion and oedema with a suggestion of consolidation, especially over the right lung. On examination of the central nervous system, the brain is recorded as showing *"...the features of generalised cerebral*

oedema with evidence of mild uncal herniation and some grooving in the tonsillar regions. Sectioning confirms the presence of diffuse oedematous change but there is no evidence of haemorrhage".

32. The significant microscopic findings are as follows. The lungs are shown to show evidence of pneumonia on both sides. No specific organisms are found. In the intestine, there are inflammatory cells at the upper limits of normal. The findings are remarkably normal. Microscopic examination of the brain shows features entirely consistent with "...widespread, generalised pericellular oedema with early neuronal changes." The findings are deemed to be entirely consistent with a history of acute cerebral hypoxia occurring shortly before death.

Apart from the post mortem report, I have not seen a formal discharge letter recording the events leading to Lucy's death.

Opinion

33. My opinion is based on my experience as a consultant paediatrician. The management of young children with a history of suspected gastroenteritis, with or without significant dehydration and with or without associated fever, is one of the most common indications for hospital admission to a children's ward.

34. This is a first draft. Much of the documentation from Erne Hospital is not very clear. I There may be additional information from the Royal Victoria Hospital, Belfast. I may amend my opinion in the light of additional information.

35. Lucy's care at Erne Hospital fell significantly below acceptable standards in several respects. It is probable that the combination of errors contributed significantly to her death. The following paragraphs summarise my opinion regarding the care that Lucy received. The observations are in chronological order.

36. I make no criticism of the general practice management. Her general practitioner carried out an examination. He did not feel that the little girl was seriously ill. Mild gastroenteritis is extremely common in young children and hospital admission is usually not required. When Lucy did not improve, her mother arranged a further general practice consultation. Dr Kirby arranged immediate hospital admission.

37. The initial clinical examination at Erne Hospital contained a number of omissions. The blood pressure was not recorded. There was no note of degree of dehydration. There was also a failure to take note of a capillary refill time (CRT) of over 2 seconds. The CRT should be less than 2 seconds, especially in a child whose temperature was increased. The respiratory rate was at the upper end of the normal range, at 40pm. The heart rate was also at the upper end of the normal rate, at 140pm (page 11, Advanced Paediatric Life Support (APLS), second edition).

38. The clinical history of not feeding for 5 days and even more significantly, the history of '*... vomiting everything*', should alert any competent children's doctor to the probability, not possibility, that Lucy would be dehydrated. A presumed diagnosis of "*viral illness*" did not give sufficient gravity to the potential seriousness of Lucy's condition at that time.

39. The initial investigations carried out were appropriate. The most significant factor is the urea value of 9.9. This is increased and is consistent with a diagnosis of at least a moderate level of dehydration. I would estimate that Lucy's level of dehydration was 5 to 7.5%. For the purpose of all calculations noted in the following paragraphs, I shall use the dehydration figure of 7.5%.

40. Lucy weighed 9.14kg. The normal fluid requirement of a child of this weight is 100ml per kg per 24 hours. Lucy's fluid requirement is therefore 914ml. Assuming a dehydration level of 7.5%, she would have lost 7.5% of her body weight. This is approximately 750ml. This is on the assumption that the child's weight before she became ill was 10kg. 7.5% dehydration is equivalent to a weight loss of 750g (or 750ml of fluid). Lucy's total fluid replacement is therefore $914 + 750 = 1,664\text{ml}$ per 24 hours or about **70ml per hour**. Estimating fluid loss is not an exact science. Lucy's fluid loss of course would not only include water. She would also have lost electrolytes in the form of sodium, chloride and potassium.

41. The standard management of Lucy on admission would be to insert an intravenous line and infuse a solution of 0.45% NaCl + 4% dextrose at a rate of 70ml per hour. If there was evidence of hypovolaemic shock, one would consider an initial bolus infusion of either 0.9% sodium chloride or human albumin solution (HAS) in a dose of 20ml per kg; in this case, 180ml. I would, probably, have given Lucy a bolus IV infusion of 180ml HAS (or possibly 90ml of HAS), followed by an hourly infusion of 0.45% NaCl with 4% dextrose with

added potassium chloride supplementation. I would base my decision regarding the giving of the bolus infusion on the little girl's clinical state of perfusion and dehydration, her blood pressure and the trend of her heart rate. By my estimation, the maximum volume of fluid that Lucy would have received up until her collapse at **03.00 hr** was either: -

$180 \text{ ml} + 245 \text{ ml} (70 \text{ ml} \times 3.5 \text{ hours}) = \underline{425 \text{ ml}}$, assuming no i.v line was obtained until 23.00 hr, or,

$180 \text{ ml} + 455 \text{ ml} (70 \text{ ml} \times 6.5 \text{ hours}) = \underline{635 \text{ ml}}$, assuming i.v line was obtained at 20.00 hr.

* I am allowing 0.5 hr for the infusion of the 180 ml HAS

42. The failure to calculate the fluid replacement and document the results in the notes is woefully substandard. The decision to infuse 100ml per hour of fluid was wrong. The decision to use 0.18% NaCl from the outset was also wrong. The decision to pour in 500 ml of 0.9% NaCl at the end was wrong.

43. Whilst I would not be critical of a doctor failing to gain intravenous access in a child of 18 months; it can be an extremely difficult technical procedure, there was an unnecessarily unacceptable delay in getting the assistance of a more experienced doctor. Lucy was admitted at **7:30pm**. The IV access was not successful until **11:00pm**. Custom and practice dictates that if a relatively junior doctor is unable to gain intravenous access after two to three attempts, he should call a more experienced colleague.

44. I am critical of the failure of the more experienced doctor Dr O'Donoghue to make any observation regarding Lucy's condition when he inserted the IV line. He should have taken the opportunity of assessing the little girl at this time, monitoring her heart rate, blood pressure, CRT, level of dehydration and also level of consciousness and awareness. There is no evidence that any of this was carried out. I am also critical of his failure to give accurate instruction regarding fluid replacement, both with regard to volume and type of fluid.

45. Lucy's collapse at **3:00am** on **13.4.00** was caused by cerebral oedema. The brain swelling caused the tonic clonic convulsion and the significant fall in conscious level. I do not think that any alternative form of treatment would have saved this little girl once she was found with fixed dilated pupils and in need of ventilatory support. The account of the events that surrounded Lucy's ^{collapse} accounts is extremely graphic. It is clear that the medical staff involved had little experience of dealing with the collapse of a young child. It is apparent that

the ward did not contain adequate resuscitation equipment or procedure, or if they did, the medical and nursing staff in charge of the ward that night did not know how to organise things properly. Whilst I am critical at this lack of expertise, I do not think that this contributed to Lucy's demise. I think that the irreversible damage had already occurred by the time she presented with fixed dilated pupils at her initial collapse.

46. I now return to the matter of the intravenous fluids. It is not entirely clear from my reading of the notes how much volume Lucy received. This in itself is indicative of substandard medical and nursing management. It is highly probable in my opinion that Lucy received far more fluid than she was actually written up for. Assuming that her weight was recorded accurately on admission, 9.14kg, and that her weight was recorded accurately at post mortem, 12kg, we have a difference in weight of **2.86kg**. [I am surprised that the RBH medical notes have no record of her weight on admission to that hospital]. One can expect some weight loss from insensible fluid loss following death. I am unaware of any information that suggested a body will gain in weight following death. If the two weights are accurate, the difference can only be explained by the presence of additional fluid, a total of **2860ml**. I am rather sceptical of the medical note written the following day noting that Lucy received 30 ml of fluid per hour. I think that this was an attempt to rewrite history. There is nothing in the contemporaneous record to indicate a volume of 30 ml per hour. There is no logic to that particular rate of infusion anyway.

47. Sick patients can develop a condition called inappropriate ADH secretion. ADH is anti-diuretic hormone. Some sick patients may retain fluid "inappropriately", causing dilution of electrolytes in the extra cellular space. There was a very significant change in Lucy's blood investigations between 7:30pm and 3:00am. Sodium had fallen to 127, potassium was very low at 2.8. Urea had returned to a normal value of 4.9 within 7 hours! I do not think that one can explain these findings on the basis of some conjectural inappropriate ADH secretion. It is far more probable that this was caused by the infusion of a too large volume of fluid, most of which was far too dilute. I would never advise the use of 0.18% NaCl in a condition like this and have not done so during my 21 years in consultant practice.

48. If intravenous fluids in the form of sodium and water is corrected too rapidly in the extra cellular space (the plasma), water will pour into the cells, causing swelling of these cells. If the cell swelling occurs in the brain, this leads to cerebral oedema. The brain is contained in the confined space of the skull and there is no room for the swollen brain to

expand. Cerebral oedema leads to raised intracranial pressure. This leads to a failure of cerebral blood flow. This can lead to a rapid fall in conscious level and consequent respiratory arrest and death. This is what occurred to Lucy at about 3:00am on 13.4.2000 (page 249, APLS).

49. If Lucy had been managed according to the basic standards of paediatric practice in a district general hospital, it is extremely unlikely in my opinion that she would have sustained cerebral oedema. She should have had more careful appraisal of her clinical state, to include an assessment of her degree of dehydration. She should have received a bolus of isotonic intravenous solution; 0.9% NaCl or HAS, in a total volume of 90 to a maximum of 180ml. She should have received 0.45% NaCl with added potassium subsequently, at a rate of no more than 70ml per hour. Careful monitoring of blood pressure, heart rate and urinary output would have allowed the medical and nursing staff the opportunity of adjusting her fluid control.

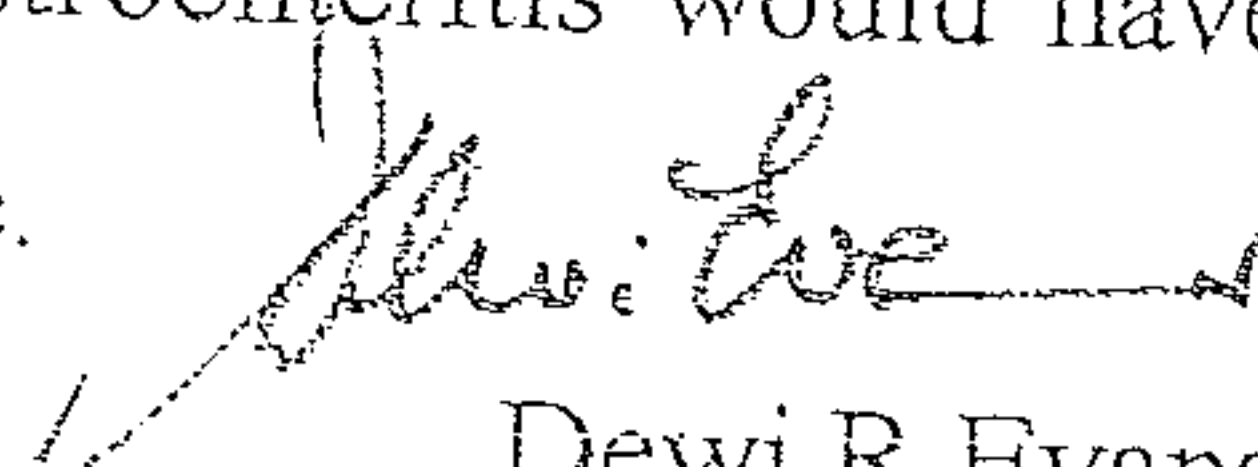
Conclusion

50. Lucy presented to hospital with a significant history of vomiting, sufficient to cause dehydration and to require intravenous fluid replacement therapy.

51. There was a failure by the admitting medical officers to assess Lucy's condition accurately. As a result of failing to carry out all the necessary assessments there was a failure to recognise the gravity of her condition. This led to a delay in the introduction of appropriate therapy, in the form of IV fluids. The level of care was significantly below acceptable standards for a district general hospital in the British Isles.

52. Both the volume of fluid that was prescribed and the concentration of fluid given were incorrect. It is also extremely likely that she actually received far more fluid than what was actually prescribed. I base this opinion on the very rapid fall in plasma, sodium and urea and the very striking difference in weight from the time of admission to the weight at post mortem.

53. Treating Lucy with the standard therapy for children with gastroenteritis would have prevented the cerebral oedema and prevented the neurological collapse.


Dewi R Evans
Consultant paediatrician



RECEIVED
H.M. Coroner's Office
26 FEB 2004

HER MAJESTY'S CORONER

DISTRICT OF GREATER BELFAST

Telephone: [REDACTED]
Fax: [REDACTED]
E-mail: jleckey [REDACTED]

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Dr Henrietta Campbell
Chief Medical Officer
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Stormount Estate
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BT4 3SJ

23rd February 2004

LUCY CRAWFORD - DECEASED

At the conclusion of the Inquest I invited submissions as to whether I should take any further action, either under Rule 23 (2) of the Coroner's Rules (a copy of which I enclose) or by referring the papers to the Director of Public Prosecutions under Article 6 (2) of the Prosecution of Offences (NI) Order 1972. Having considered submissions from the legal representatives I decided that the appropriate course was for me to refer the Inquest papers to you and to the General Medical Council but not the Director of Public Prosecutions.

Accordingly I am enclosing a full set of the Inquest papers with the exception of the reports of the expert witnesses and the correspondence of Sperrin Lakeland Trust which I forwarded to you with my letter of 19th February 2004.

Whilst the protocol devised by your working party has not been criticised in any way (in fact it has been praised) by any of those who gave evidence either at this Inquest or the Inquest into the death of Raychel Ferguson, nonetheless, there may be merit in the working party examining the Inquest papers in relation to the death of Lucy to see if any changes to the protocol might be required. In addition, the evidence at the Inquest highlighted serious shortcomings in medical record keeping and the understanding of the nurses as to the fluid regime that had been prescribed. Is it the responsibility of the Medical Director of a hospital to ensure that proper standards of medical record keeping are maintained?

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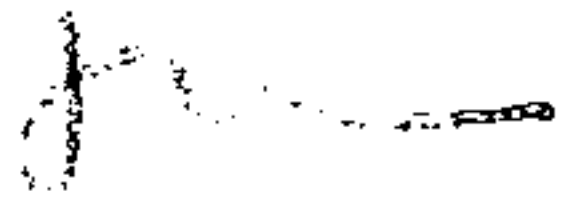
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Is there any monitoring of the standard of medical record keeping? Are nurses now briefed on a regular basis as to the implications of the protocol? I pose these questions as they relate to issues which really do concern me.

I look forward to receiving your views.

With kind regards.

Yours sincerely



J L LECKEY
H M CORONER FOR GREATER BELFAST

Enc

[17.-(1) A document may be admitted in evidence at an inquest if the coroner considers that the attendance as a witness by the maker of the document is unnecessary and the document is produced from a source considered reliable by the coroner.

(2) If such a document is admitted in evidence at an inquest the inquest may, at the discretion of the coroner, be adjourned to enable the maker of the document to give oral evidence if the coroner or any properly interested person reasonably so desires.

(3) Such a document shall be marked by the coroner in accordance with these rules with the additional words "received pursuant to Rule 17".¹⁸

18. All exhibits produced in evidence at an inquest shall be marked with consecutive numbers and each number shall be preceded by the letter "C".

19. The coroner shall make, or cause to be made, a note of the evidence of each witness, and such note shall be signed by the witness and also by the coroner.

20. No person shall be allowed to address the coroner or the jury as to the facts unless the coroner shall so permit.

21. [Where the coroner sits with a jury he shall sum up the evidence to the jury and draw their attention to such of these Rules as may be relevant before they consider their verdict.]¹⁹

22.-(1) After hearing the evidence the coroner, or where the inquest is held by a coroner with a jury, the jury, after hearing the summing up of the coroner shall give a verdict in writing, which verdict shall, so far as such particulars have been proved, be confined to a statement of [the matters specified in Rule 15].²⁰

(2) When it is proved that the deceased took his own life the verdict shall be that the deceased died by his own act, and where in the course of the proceedings it appears from the evidence that at the time the deceased died by his own act the balance of his mind was disturbed, the words "whilst the balance of his mind was disturbed" may be added as part of the verdict.

23.-(1) Any verdict given in pursuance of Rule 22 shall be recorded in the form set out in the Third Schedule.

[(2) A coroner who believes that action should be taken to prevent the occurrence of fatalities similar to that in respect of which the inquest is being held, may announce at the inquest that he is reporting the matter to the person

¹⁷ The proviso to Rule 16 (nothing in this Rule to preclude the coroner or jury from making a recommendation designed to prevent the recurrence of similar fatalities) was revoked by the Schedule to the 1980 Rules.

¹⁸ Rule 17 substituted by the Schedule to the 1980 Rules.

¹⁹ Rule 21 substituted by the Schedule to the 1980 Rules.

Reference to Rule 15 substituted by the Schedule to the 1980 Rules.

006-001-024

or authority who may have power to take such action and report the matter accordingly.]²¹

Removal and Deposit of Bodies

24.-(1) Each coroner shall make arrangements with one, or more than one, reputable funeral undertaker for the expeditious removal, in appropriate vehicles, of dead bodies which require to be removed for the purpose of investigating the cause of death or otherwise, and such means of transport shall be used wherever it is practicable to do so.

(2) Where a coroner takes possession of a dead body he shall, if necessary, take appropriate measures to ensure that the body will not decompose while it is in his possession, and for that purpose he may take such steps to preserve the body as he deems necessary.

(3) Where a dead body is conveyed to a mortuary ...²² or other suitable place, the body, and the clothing, if any, shall be carefully examined for any articles or property that may be thereon, and an inventory of the clothing and other articles or property found on the body or amongst the articles of clothing shall be made, and at least two persons shall be present when this duty is performed.

The examination and preparation of the inventory shall be carried out by the mortuary attendant or by such other person as may be deputed by the authority or person in charge of the mortuary ... or place, and shall be witnessed by the constable or other person who accompanied the body, and the inventory shall be signed both by the person making the examination and by the witness. If a relative is available, he shall be invited to be present and to act as a witness should he so desire.

The person in charge of the mortuary ... or place shall not allow the body to be removed therefrom without the sanction of the coroner, and all articles taken from the body shall, unless required by the Police, be retained in safe keeping by the person in charge of the mortuary ... or place until they are no longer required for purposes of the investigation or inquest, when they shall be handed over to the next of kin of the deceased or his representative.

Post-Mortem Examinations

25. Where a coroner directs or requests that a post-mortem examination shall be made, it shall be made as soon after the death of the deceased as is reasonably practicable.

26. [If the deceased died in a hospital, the coroner shall not direct or request a pathologist on the staff of, or associated with, that hospital to make a post-mortem examination if:-

- (i) that pathologist does not desire to make the examination, or

²¹ Rule 23(2) substituted by the Schedule to the 1980 Rules.

²² The word "morgue", wherever it occurs in Rule 24(3), was deleted by the Schedule to the 1980 Rules.



HER MAJESTY'S CORONER

DISTRICT OF GREATER BELFAST

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The Fitness to Practice Directorate
The General Medical Counsel
178 Great Portland Street
LONDON
W1 N6JE

23rd February 2004

Dear Sirs

INQUEST INTO THE DEATH OF LUCY CRAWFORD – DECEASED

On 19th February I concluded an Inquest into the death of a 17 month old girl called Lucy Crawford who died in the Royal Belfast Hospital for Sick Children on 14th April 2000. I am enclosing a copy of my verdict which gives particulars of the deceased, the cause of death I arrived at and my findings.

At the conclusion of the Inquest and having heard submissions from legal representatives acting on behalf of the family and the Hospital Trust I announced that I would be reporting the circumstances of the death to the Chief Medical Officer for Northern Ireland, Dr Henrietta Campbell, and the General Medical Council. The reason I decided to do so was that I had very serious concerns about the quality of the medical care Lucy received whilst a patient in the Erne Hospital, Enniskillen and in particular, the role of two of the medical staff – Dr Amer Ullas Malik and Dr J M O'Donohue who is a Consultant Paediatrician. Dr O'Donohue declined to give any evidence at the Inquest and as a consequence of that decision I read out a statement he had made previously. (Incidentally I understand Dr Malik has now returned to Pakistan. (His GMC registration number is 5187318).

In order to enable you to consider this referral I am enclosing a full set of the Inquest papers comprising: -

1. A list of witnesses.
2. A preliminary statement I made at the commencement of the Inquest.
3. The post mortem report.
4. A copy of the Death Certificate originally issued.

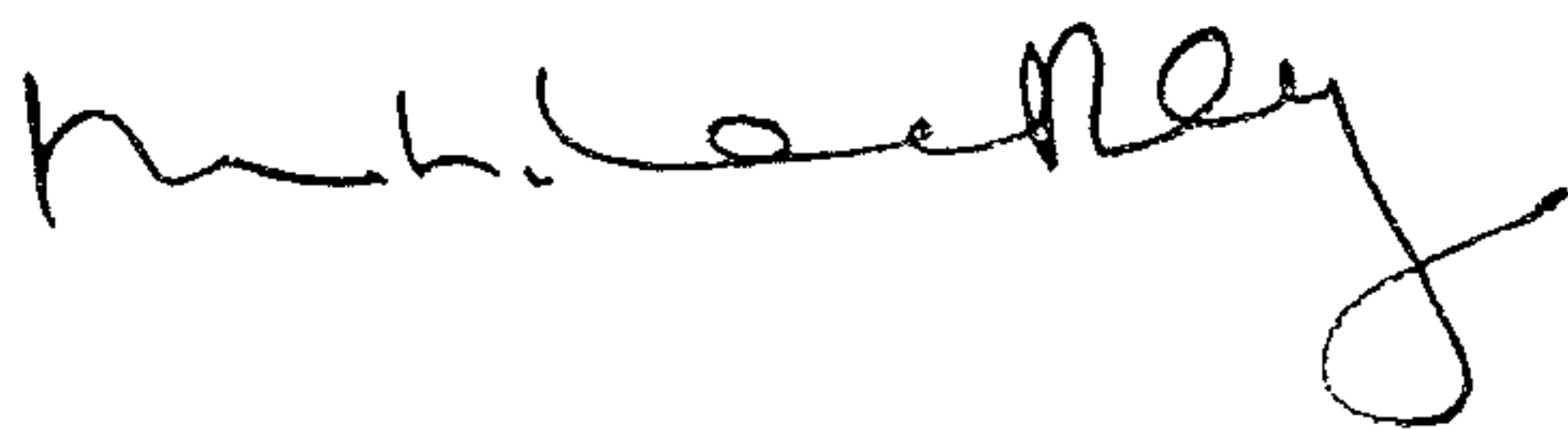
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5. A copy of the report of Dr Edward Sumner.
6. A copy of the report of Dr Dewi Evans.
7. A copy of the report of Dr John G Jenkins.
8. Copy correspondence from Sperrin Lakeland Trust to the father of Lucy, Mr Neville Crawford. I would draw your attention to the third paragraph of the letter where it states "the outcome of our review has not suggested that the care provided to Lucy was inadequate or of poor quality." This is at variance with the views of the three experts (Dr Sumner, Dr Evans and Dr Jenkins) and evidence given by Dr Auterson who is a Consultant Anaesthetist at the Erne Hospital and was involved with the treatment of Lucy whilst she was a patient there.
9. Copy depositions. Where I have made a long hand note summarising additional evidence given, I am enclosing a typed transcript of this.
10. Relevant correspondence.

I should be grateful if you would acknowledge receipt of this letter. If you feel I can assist further in any way please do not hesitate to contact me.

Yours faithfully



J L LECKEY
H M CORONER FOR GREATER BELFAST

Encs

CORONERS CERTIFICATE

To be sent to the Registrar within FIVE DAYS after the Inquest.

To the Registrar of Births, Deaths and Marriages for the District of GREATER BELFAST

I HEREBY CERTIFY that at an Inquest held at THE OLD TOWNHALL BUILDING, 80 VICTORIA STREET, BELFAST on TUESDAY the 17TH to THURSDAY the 19TH of FEBRUARY 2004 before me Mr J L Leckey, HM Coroner for the District of GREATER BELFAST touching the death of LUCY REBECCA CRAWFORD.

I found as follows:

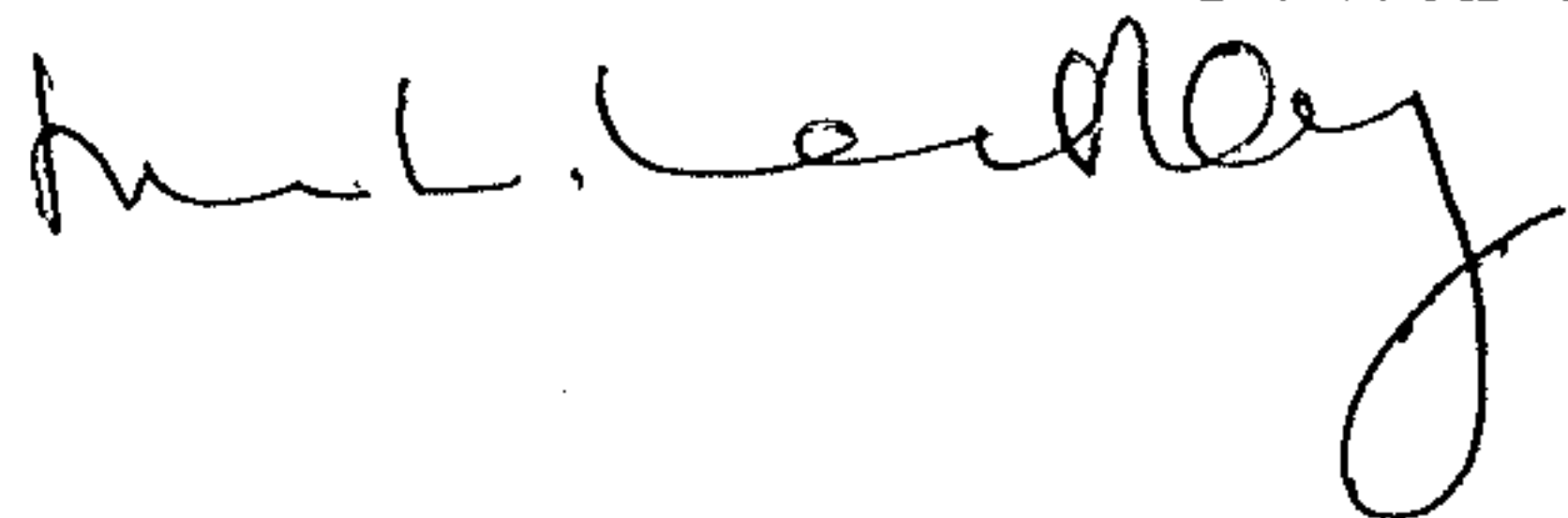
1. Name and Surname: LUCY REBECCA CRAWFORD
2. Sex: FEMALE
3. Date of Death: 14 April 2000
4. Place of Death: ROYAL BELFAST HOSPITAL FOR SICK CHILDREN
5. Usual address (if different from place of death): [REDACTED]
[REDACTED]
6. Marital Status: SINGLE
7. Date and Place of Birth: November 5 1998, ERNE HOSPITAL ENNISKILLEN
8. Occupation: DAUGHTER OF WILLIAM NEVILLE CRAWFORD, [REDACTED]
[REDACTED]
9. Maiden Surname (of woman who had married): N/A
10. Cause of Death: 1(a) CEREBRAL OEDEMA (b) ACUTE DILUTIONAL HYPONATRAEMIA (c) EXCESS DILUTE FLUID 11 GASTROENTERITIS
11. Findings:

On 12th April 2000 the deceased, who was aged 17 months was admitted to the Erne Hospital, Enniskillen with a history of poor oral intake, fever and vomiting. The vomiting was sufficient to have caused a degree of dehydration and she required intravenous fluid replacement therapy. It was believed she was suffering from gastroenteritis. Her condition did not improve and she collapsed at about 3.00am on 13th April, developing thereafter decreased respiratory effort and fixed and dilated pupils. Whilst in a moribund state she was transferred by ambulance shortly after 6.00am to the Royal Belfast Hospital for Sick Children. Her condition remained unchanged and after two sets of brain-stem tests were performed

showing no signs of life she was pronounced dead at 13.15 hours on 14th April. She had become dehydrated from the effects of vomiting and the development of diarrhoea whilst in the Erne Hospital and she had been given an excess volume of intravenous fluid to replace losses of electrolytes. The collapse which led to her death was a direct consequence of an inappropriate fluid replacement therapy in that the use of 0.18% saline to make up deficits from vomiting and diarrhoea was wrong, too much of it was given and there had been a failure to regulate the rate of infusion. This led to the development of dilutional hyponatraemia which in turn caused acute brain swelling and death. The errors in relation to the fluid replacement therapy were compounded by poor quality medical record keeping and confusion by the nursing staff as to the fluid regime prescribed.

Witness my hand this 19TH FEBRUARY 2004

Signature



Coroner for GREATER BELFAST

CORONERS ACT (NORTHERN IRELAND) 1959

VERDICT ON INQUEST

On an inquest taken for our Sovereign Lady the Queen, at THE OLD TOWNHALL BUILDING, 80 VICTORIA STREET, BELFAST in the County Court Division of GREATER BELFAST on TUESDAY the 17TH to THURSDAY the 19TH of FEBRUARY 2004, before me MR J L LECKEY HM Coroner for the district of GREATER BELFAST touching the death of LUCY REBECCA CRAWFORD to inquire how, when and where the said LUCY REBECCA CRAWFORD came to her death, the following matters were found:

1. Name and surname of deceased: LUCY REBECCA CRAWFORD
2. Sex: FEMALE
3. Date of Death: 14 April 2000
4. Place of Death: ROYAL BELFAST HOSPITAL FOR SICK CHILDREN
5. Usual Address: [REDACTED]
6. Marital Status: SINGLE
7. Date and Place of Birth: 5 November 1998 at
8. Occupation: DAUGHTER OF WILLIAM NEVILLE CRAWFORD, [REDACTED]
[REDACTED]
9. Maiden Surname: N/A
10. Cause of Death: 1(a) CEREBRAL OEDEMA (b) ACUTE DILUTIONAL
HYPONATRAEMIA (c) EXCESS DILUTE FLUID 11
GASTROENTERITIS

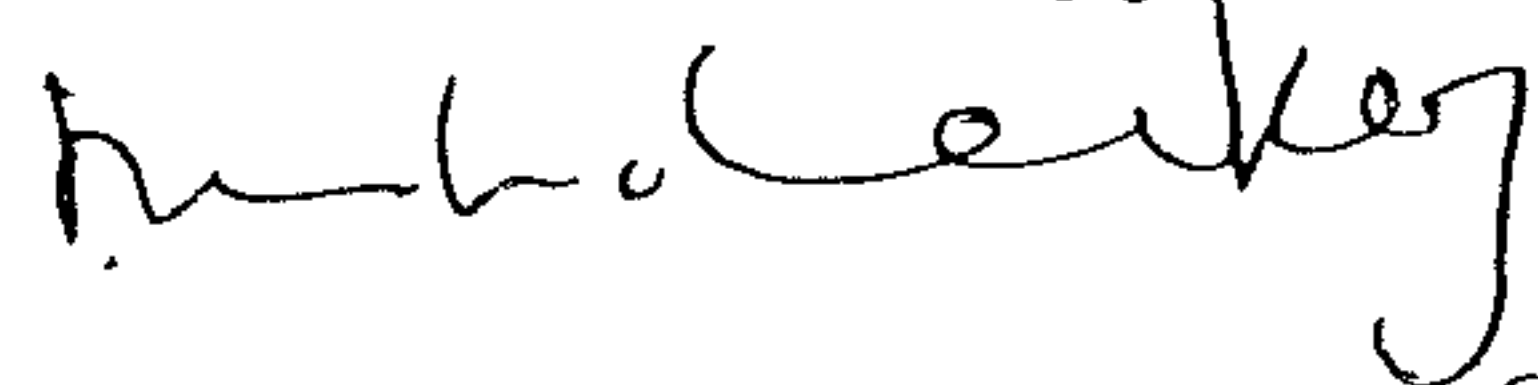
Findings:

On 12th April 2000 the deceased, who was aged 17 months was admitted to the Erne Hospital, Enniskillen with a history of poor oral intake, fever and vomiting. The vomiting was sufficient to have caused a degree of dehydration and she required intravenous fluid replacement therapy. It was believed she was suffering from gastroenteritis. Her condition did not improve and she collapsed at about 3.00am on 13th April, developing thereafter decreased respiratory effort and fixed and dilated pupils. Whilst in a moribund state she was transferred by ambulance shortly after 6.00am to the Royal Belfast

Hospital for Sick Children. Her condition remained unchanged and after two sets of brain-stem tests were performed showing no signs of life she was pronounced dead at 13.15 hours on 14th April. She had become dehydrated from the effects of vomiting and the development of diarrhoea whilst in the Erne Hospital and she had been given an excess volume of intravenous fluid to replace losses of electrolytes. The collapse which led to her death was a direct consequence of an inappropriate fluid replacement therapy in that the use of 0.18% saline to make up deficits from vomiting and diarrhoea was wrong, too much of it was given and there had been a failure to regulate the rate of infusion. This led to the development of dilutional hyponatraemia which in turn caused acute brain swelling and death. The errors in relation to the fluid replacement therapy were compounded by poor quality medical record keeping and confusion by the nursing staff as to the fluid regime prescribed.

Date: 19TH FEBRUARY 2004

Signed:



Coroner for GREATER BELFAST

THIS CERTIFICATE MUST BE DELIVERED WITH THE DECEASED'S MEDICAL CARD WITHIN FIVE DAYS TO THE REGISTRAR FOR THE DISTRICT IN WHICH THE PERSON (a) DIED OR (b) WAS ORDINARILY RESIDENT (WITHIN NORTHERN IRELAND) IMMEDIATELY BEFORE DEATH

FOR INSTRUCTIONS TO INFORMANTS
SEE OVERLEAF

MEDICAL CERTIFICATE OF CAUSE OF DEATH

Births and Deaths Registration (Northern Ireland) Order 1976, Article 25(2)

FOR USE OF REGISTRAR

Entry No

District

To be signed by a Registered Medical Practitioner WHO HAS BEEN IN ATTENDANCE during the last illness of the deceased person and given to some person required by Statute to give information of the death to the Registrar. (SEE OVERLEAF)

Name of Deceased LUCKY CRAWFORD

Usual Residence [REDACTED]

Place of Death PAEDIATRIC INTENSIVE CARE UNIT, RBHSC (ROYAL BELFAST HOSPITAL FOR SICK CHILDREN)

Date of Death 14th day of APRIL 2000

Date on which last seen alive and treated by me for the undermentioned conditions 14th day of APRIL 2000

Whether seen after death by me YES

Whether seen after death by another medical practitioner

CAUSE OF DEATH		These particulars not to be entered in Death Register
I	I	Approximate interval between onset and death (years, months, weeks, days, hours)
Disease or condition directly leading to death*	(a) <u>CEREBRAL OEDEMA</u> due to (or as a consequence of)	
Antecedent causes	(b) <u>DEHYDRATION</u> due to (or as a consequence of)	
Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last.	(c) <u>GASTROENTERITIS</u>	
II	II	
Other significant conditions contributing to the death, but not related to the disease or condition causing it.		

* does not mean the mode of dying eg heart failure, asthma, etc. It means the disease, injury or complication which caused death.

I hereby certify that the above-named person has died as a result of the natural illness or disease for which he has been treated by me within twenty-eight days prior to the date of death, and that the particulars and cause of death above written are true to the best of my knowledge and belief.

[Signature]

Qualifications as registered by General Medical Council MR BAO BCH DCH MRCP (PAEDI)

Residence PAEDIATRIC INTENSIVE CARE UNIT RBHSC

Date 04/05/00 2000

The Health Service Number of the deceased should be entered here by the certifying doctor. [REDACTED]

LUCY CRAWFORD deceased

As the events leading up to the holding of this inquest are unusual, I consider it appropriate to make a preliminary statement by way of explanation.

On 14th April 2000 Dr Donncha Hanrahan, who is a Consultant in Paediatric Neurology at the Royal Belfast Hospital for Sick Children, telephoned my office to report the death of Lucy Crawford aged 17 months. Lucy had died that day in the hospital's Paediatric Intensive Care Unit following transfer from the Erne Hospital the previous day. The clinical history given was of *gastroenteritis, dehydration and brain swelling*. Advice was then sought from a pathologist attached to the State Pathologist's Department as to whether the clinical history warranted a coroner's post-mortem examination being carried out. Following a consultation between the pathologist and Dr Hanrahan my office was advised that it would be appropriate for a death certificate to be issued giving *gastroenteritis* as the cause of death.

On 27th February 2003 I received a letter from Mr Stanley E Millar, Chief Officer of the Western Health and Social Services Council in which he referred to an inquest I had held a short time previously into the death of Raychel Zara Ferguson aged 9 years. She had died from *cerebral oedema due to hyponatraemia* and I understand that the publicity surrounding the inquest led Mr Miller to speculate if the two deaths had any common features. In his letter he said this:

"I was struck by the similarities in the two tragedies and in particular the details of the solutions used in the drip set up for Lucy Crawford which are clearly recorded in the Medical Notes I hold (as supplied by the Erne Hospital).

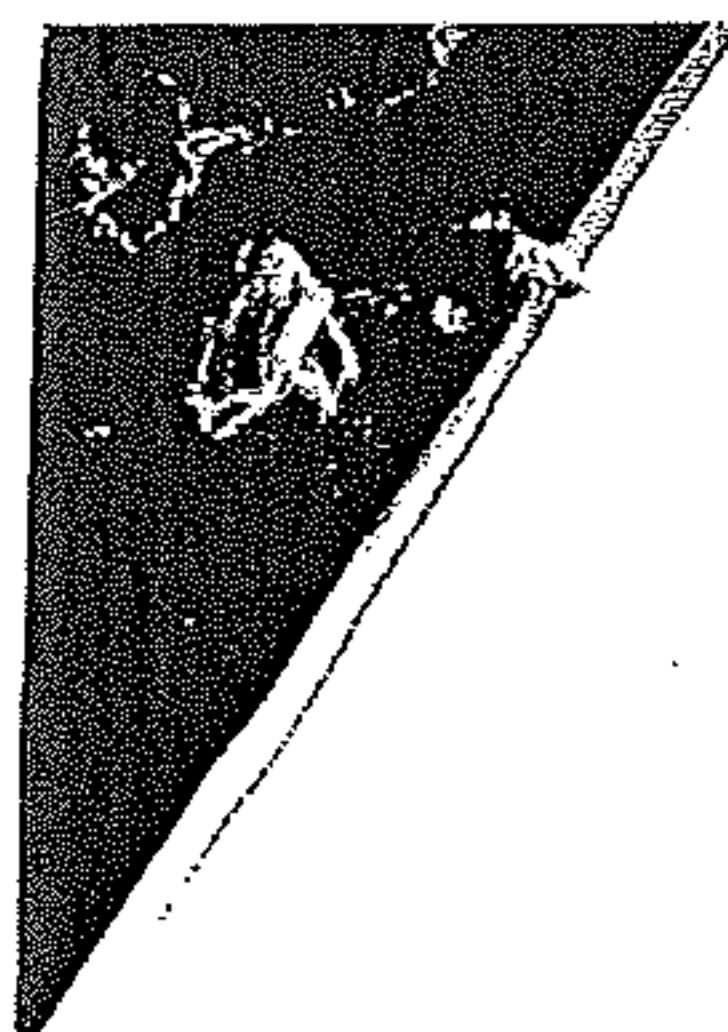
You will appreciate my concerns over the cause for the death of an 18 month old little girl which were to my mind unexplained were rekindled by Raychel's death.

I am left with two questions which you may be able to answer

- 1 Are there direct parallels in the events leading up to the deaths of both girls?*
- 2 Would an Inquest in 2000/2001 have led to the recommendations from the Raychel Ferguson inquest being shared at an earlier date and the consequent saving of her life?*

I am also left with a query as to other similar uncovered deaths across the UK. At least the Altnagelvin Medical Team have "broadcast" the phenomena of Hyponatraemia and raised an awareness of the potential problem with children."

It was only when I read Mr Miller's letter that I became aware that in fact a post-mortem examination had been carried out later by a consultant paediatric

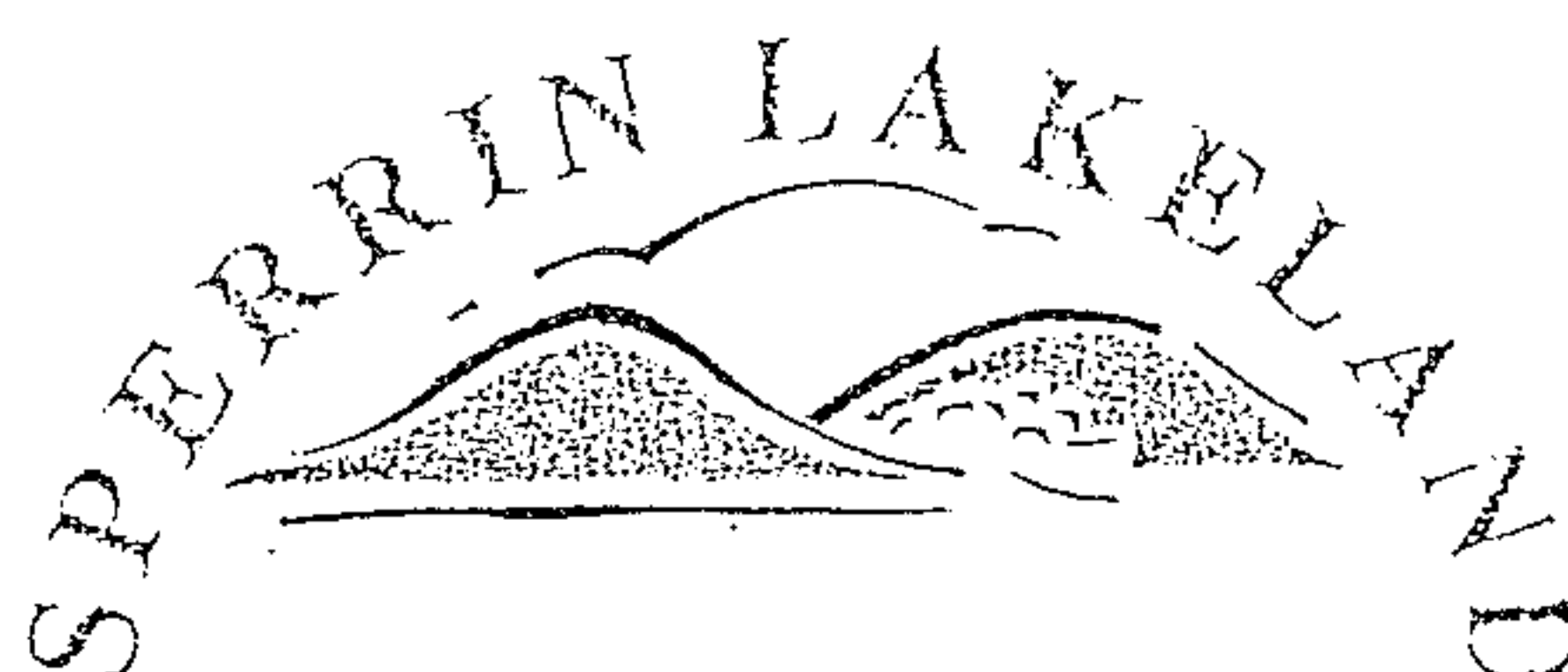


pathologist attached to the Royal Victoria Hospital. This was not a coroner's post-mortem but a "consent" post-mortem for which, I assume, the consent of Lucy's parents was sought and obtained. I then obtained a copy of the post-mortem report and considered the findings of the pathologist. These indicated to me that the deaths of Raychel and Lucy might have common features and that it would be necessary to obtain a further specialist report. With the benefit of hindsight, it would have been helpful if I had been advised of the post-mortem findings at an early stage.

When I was investigating the death of Raychel I obtained an independent expert report from Dr Edward Sumner. He is a Consultant Paediatric Anaesthetist who was formerly on the staff of the Great Ormond Street Hospital for Children in London. I asked him to prepare a report for me concerning the death of Lucy. His conclusions indicated that the two deaths did indeed have common features.

I considered that it was essential for an inquest to be held into the death of Lucy. As a death certificate had been issued and, arguably, I was *functus officio*, I applied to the Attorney General for a direction under the provisions of section 14 of the Coroners Act (Northern Ireland) 1959 that an inquest should be held by me. I provided the Attorney General with all relevant documentation including the post-mortem report and the report of Dr Sumner. On 12th December 2003 I was informed that the Attorney General had exercised his powers under section 14 and that I had been directed to hold an inquest into the death of Lucy.

JOHN L LECKEY
HM CORONER FOR GREATER BELFAST



HEALTH AND SOCIAL CARE TRUST

TRUST HEADQUARTERS
STRATHDENE HOUSE

TYRONE AND FERMANAGH HOSPITAL, OMAGH, CO. TYRONE BT79 0NS. TELEPHONE [REDACTED]

FACSIMILE [REDACTED]

*NOTE: The Trust's telephone number has changed
The New Number is: [REDACTED]*

Minicom Service is available within the Trust on request

Our Ref: COM 3

Your Ref:

Date: 30 March 2001

PRIVATE & CONFIDENTIAL

Mr Neville Crawford

Dear Mr Crawford

Thank you for your letter of 16 March 2001. I note your desire for a specific response to your concerns regarding the adequacy and quality of care provided to Lucy in April of last year. I fully appreciate that there are many unanswered questions for yourself and Mrs Crawford regarding the causes of Lucy's death. Indeed, as Bridget, and later Michael MacCrossan, on my behalf, sought to clarify for you, the reason we initiated the review, was our concern with the speed of Lucy's deterioration.

In sharing Mr Fee's report with you under cover of Mr MacCrossan's letter dated 10 January, it was, and continues to be, our hope that this will have started to provide some of the answers to your questions.

Turning specifically to the point made in your most recent correspondence, the outcome of our review has not suggested that the care provided to Lucy was inadequate or of poor quality. As you will be aware, the Trust engaged an independent consultant, from another Trust, to review Lucy's case notes and to advise us on this very question. We do however accept and acknowledge that our review has flagged up issues which the Trust will wish to address for the future. These include communication and written records, and are referred to in Mr Fee's report.

DHSSPS

2

Mr Neville Crawford

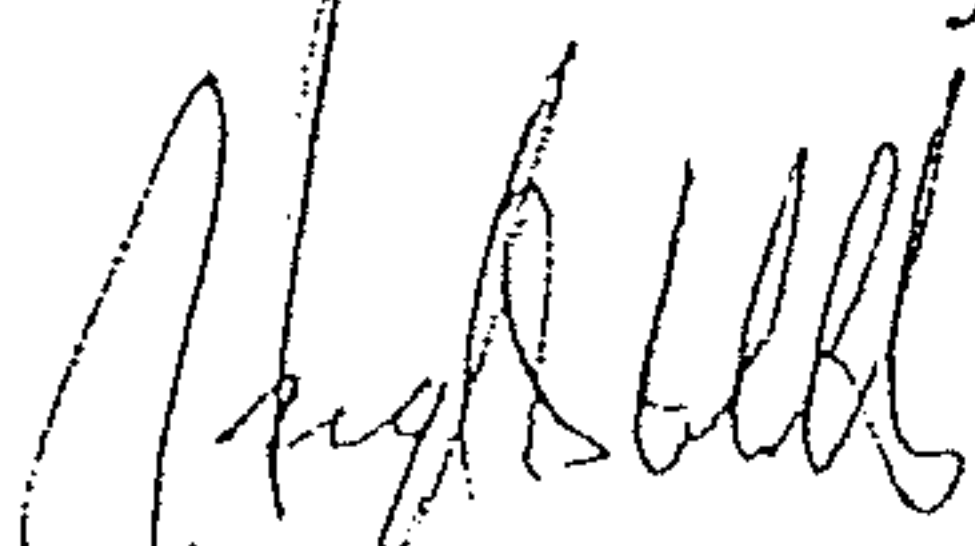
29 March 2001

As indicated in previous correspondence we are very mindful of the pain and loss that you and your wife have endured. We are also conscious that the anniversary of Lucy's death is very close. We genuinely believe that it would be helpful if you would be willing to participate in a meeting with the Trust regarding the findings of our review. I would wish to reiterate the concern we expressed in providing you with a written response to a matter of such considerable sensitivity, and again for this reason, would wish to encourage you to avail of the opportunity to meet with us.

Should you feel able and wish to participate in a meeting, I would be very happy to consider making available those whom you feel would be helpful to participate from the Trust's point of view. Certainly I believe it would be helpful if Mr Fee, the Director of Hospital Services, participated. Perhaps you would wish to discuss this with Mr Millar, Chief Officer of the Western Health and Social Services Council, whom I understand has been providing some guidance and support to you and your wife.

I trust this further letter helps to address more specifically your concerns about the adequacy and the quality of the care provided to Lucy. I appreciate that it does not add further to the detail already provided in Mr Fee's report. I would however hope that a meeting would enable specific issues and questions to be explored. I trust this has been helpful, and as indicated, would ask you to consider contacting Bridget O'Rawe our Complaints Manager, in order that arrangements for a meeting might be progressed.

Yours sincerely



Hugh Mills
Chief Executive

bor/cd/3914

DHSSPS

006-001-036



REVIEW OF THE LATE LUCY CRAWFORD CASE

INFORMATION & BACKGROUND

This Review into the care and progress of Lucy's condition was conducted by Dr Anderson, Clinical Director, Women & Children's Directorate and Mr Fee, Director of Acute Hospital Services.

This Review was initiated because of the sudden and unexpected outcome of Lucy's condition and was in keeping with the Trust's developing arrangements for the Review of such cases as part of its Clinical and Social Governance arrangements.

Lucy's death and the circumstances around her stay at the Erne Hospital was notified to Dr Kelly, Medical Director on Friday 14 April 2000 by Dr O'Donohoe, Consultant Paediatrician.

The Review involved an examination of Lucy's casenotes, receiving and reviewing comments/reports from those involved in Lucy's care and an examination of the casenotes and a discussion with Dr Quinn, Consultant Paediatrician, Altnagelvin Hospital. The Review has also considered comments from Sr Traynor, Mrs Martin, Infection Control Nurse and Post Mortem Report.

PURPOSE OF REVIEW

The main purpose of the review was to trace the progression of Lucy's illness from her admission to the Erne Hospital and her treatments/interventions in order to try and establish whether:

- a) There is any connection between our activities and actions, and the progression and outcome of Lucy's condition
- b) Whether or not there was any omission in our actions and treatments which may have influenced the progression and outcome of Lucy's condition
- c) Whether or not there are any features of our contribution to care in this case which may suggest the need for change in our approach to the care of patients within the Paediatric Department or wider hospital generally

FINDINGS

Lucy Crawford was admitted to the Children's Ward, Erne Hospital on 12 April 2000 at approximately 7.30pm having been referred by her General Practitioner. The history given was one of 2 days fever, vomiting and passing smelly urine. The General Practitioner's impression was that Lucy was possibly suffering from a urinary tract infection. The patient was examined by Dr Malik, Senior House Officer, Paediatrics, who made a provisional diagnosis of viral illness. She was admitted for investigation and administration of IV fluids. Lucy was considered to be no more or less ill than many children admitted to this department. Neither the postmortem result or the independent medical report on Lucy Crawford, provided by Dr Quinn, can give an absolute explanation as to why Lucy's condition deteriorated rapidly, why she had an event described as a seizure at around 2.55am on 13 April 2000, or why cerebral oedema was present on examination at postmortem.

ISSUES ARISING

1 Level of Fluid Intake

Lucy was given a mixture of oral fluids and intravenous infusion of solution 18 between her admission, at around 7.30pm on 12 April 2000, and the event that happened around 2.55am on 13 April 2000. Dr Quinn is of the view that the intravenous solution used and the total volume of fluid intake, when spread over the 7 ½ hour period, would be within the accepted range and has expressed his surprise if those volumes of fluid could have produced gross cerebral oedema causing coning.

There was no written prescription to define the intended volume. There was some confusion between the Consultant, Senior House Officer and Nurses concerned in relation to the intended volume of fluid to be given intravenously. There is a discrepancy in the running total of the intravenous infusion of solution 18 for the last 2 hours. There is no record of the actual volume of normal saline given when commenced on a free flowing basis.

2 Level of Description of Event

Retrospective notes have been made by nursing and medical staff in respect of the event which happened at around 2.55am on 13 April 2000. In all of these descriptions and the subsequent postmortem report the event is described as a seizure. With the exception of Nurse McCaffrey's report, little detailed descriptions of the event are recorded and no account appears to be in existence of the mother's description who was present and discovered Lucy in this state.

3 Reporting Incident

While a procedure for reporting and the initiation of an investigation into Clinical Instances/Untoward Events was not in existence universally, at the time of Lucy's admission to the Erne Hospital, Dr O'Donohoe proactively reported the unexpected outcome of Lucy's condition to Dr Kelly, Medical Director.

4 Communications

The main communication issue identified within this review was the confusion between all those concerned in relation to the intended prescribed dosage of intravenous fluids. The record shows that Dr O'Donohoe's intention or recollection was that Lucy should have 100mls bolus of fluids in the first hour and 30mls hourly thereafter. While the Nursing staff held a clear view that the expressed intention was to give 100mls hourly until Lucy passed urine. Furthermore this was considered by the Nursing staff interviewed to be a standard approach in such circumstances. This clearly demonstrates the need for standard protocols for treating such patients and the need, in keeping with required practice, to have a clearly written prescription.

5 Documentation

The main issues identified here are the need for clearly documented prescriptions for intravenous fluids, the accurate documentation of the fluid administration, and the need to document patients or parents descriptions of unusual clinical events, such as the seizure, describing the detail which may be required at a later date.

6 Care of Family

Mrs Doherty, Health Visitor, and Dr O'Donohoe were proactive in offering support to the family and given the opportunity to explain where possible the reasons for the change in Lucy's condition and support them in their bereavement.

7 Team Support

All team members involved in Lucy's care were shocked and traumatised by the unexpected deterioration in her condition. A team briefing consisting of all disciplines did not take place. Such a process may help support those concerned and reduce the fear of attempts to apportion blame between team members.

8 Linkage with the Regional Centre

A number of issues arose in respect of our link with Regional Services in this case. These included the arrangements to support the transfer of such patients, the need for greater communication between the local hospital and the regional hospital in respect of feedback which is to be given to parents in such instances and the significant time delay in getting access to the final postmortem report.

The Review Team have made a number of recommendations including a proposal for a further meeting with the Crawford Family along with relevant Clinical Staff so that the Review can be shared. We would hope that the Family would avail of a meeting.

Station Dealing With Case: GROSVENOR ROAD

Death to be registered at ENNISKILLEN

LUCY REBECCA CRAWFORD Jury: No

Late of [REDACTED]

Occupation: N/A

Marital Status: SINGLE

Maiden Name: N/A

Date of Birth: 5 November 1998 Place of Birth

Date and place of death: 14 April 2000 ROYAL BELFAST HOSPITAL FOR SICK CHILDREN

Cause: 1(a) CEREBRAL OEDEMA (b) ACUTE DILUTIONAL HYPONATRAEMIA (c) EXCESS DILUTE FLUID 11 GASTROENTERITIS

History: THE DECEASED DIED IN THE ROYAL VICTORIA HOSPITAL ON THE 13TH APRIL

Witnesses:

1. DR EDWARD SUMNER - MA, BM, BCh, FRCA - CONSULTANT PAEDIATRIC ANAESTHETIST, [REDACTED]

2. DR PETER CREAN - CONSULTANT PAEDIATRIC ANAESTHETIST - ROYAL BELFAST HOSPITAL FOR SICK CHILDREN, GROSVENOR ROAD, BELFAST, BT12 6BA

3. DR DONNCHA HANRAHAN - CONSULTANT PAEDIATRIC NEUROLOGIST - ROYAL BELFAST HOSPITAL FOR SICK CHILDREN, GROSVENOR ROAD, BELFAST, BT12 6BA

4. STAFF NURSE THECLA JONES - C/O THE ERNE HOSPITAL, CORNGRADE ROAD, ENNISKILLEN, BT74 6DU

5. STAFF NURSE SALLY McMANUS - C/O THE ERNE HOSPITAL, CORNGRADE ROAD, ENNISKILLEN, BT74 6DU

6. STAFF NURSE BRID SWIFT - C/O THE ERNE HOSPITAL, CORNGRADE ROAD, ENNISKILLEN, BT74 6DU

7. NURSE TERESA McCAFFREY - C/O THE ERNE HOSPITAL, CORNGRADE ROAD, ENNISKILLEN, BT74 6DU

8. DR T AUTERSON - F.F.A.R.C.S. - CONSULTANT ANAESTHETIST, C/O THE ERNE HOSPITAL, CORNGRADE ROAD, ENNISKILLEN, BT74 6DU

9. DR O'DONOHUE - CONSULTANT PAEDIATRICIAN - C/O THE ERNE HOSPITAL, CORNGRADE ROAD, ENNISKILLEN, BT74 6DU

10. DR DEWI EVANS MB, FRCP, FRCPCH, Dobst - CONSULTANT
PAEDIATRICIAN, DEPARTMENT OF CHILD HEALTH, SINGLETON
HOSPITAL, SKETTY LANE, SWANSEA, SA2 8QA

11. DR JOHN G JENKINS - MD, FRCP, FRCPCH - CONSULTANT
PAEDIATRICIAN, ANTRIM AREA HOSPITAL, 45 BUSH ROAD, ANTRIM,
BT41 2RL

12. DR AISLING KIRBY - DERRYLIN SURGERY, 75 MAIN STREET,
DERRYLIN, ENNISKILLEN, BT92 9LB

13. MRS MAE CRAWFORD - [REDACTED]
[REDACTED]

14. MR NEVILLE CRAWFORD, [REDACTED]
[REDACTED]

Notify:

Form 20

CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on TUESDAY the 17th day of FEBRUARY 2004, at inquest touching the death of LUCY CRAWFORD, before me MR. J L LECKEY Coroner for the District of GREATER BELFAST as follows to wit:-

The Deposition of MAE ELIZABETH CRAWFORD of [REDACTED]
[REDACTED] who being sworn upon her oath, saith

My daughter Lucy Crawford was born on 5th November 1998 at the Erne Hospital, Enniskillen. She was a healthy child.

On Tuesday 11th April 2000 Lucy had been left to our babysitter as normal while I went to work. At approximately 11.15am our babysitter rang me to work to tell me that Lucy had vomited. I left work at about midday and brought Lucy home. When I got home I telephoned our GP Dr. Graham and made an appointment for Lucy at 2.30pm. Lucy was sick twice on the journey to the Health Centre.

Dr. Graham examined Lucy and said that he couldn't see anything wrong and that there was nothing to worry about. I brought Lucy home again. She played a little with her toys. Although she refused milk at bedtime she slept all night.

On the morning of Wednesday 12th April 2000 I found Lucy standing up in her cot at about 7.45am. She seemed in reasonable form but we decided that Neville would stay home with Lucy. When I came home from work at approximately 1.00pm Lucy was lying on a Bean Bag in the sitting room. I checked Lucy's temperature and gave her a small drink. I gave Lucy some Calpol and she fell asleep. Later at approximately 3.15pm she took another small drink and sat on my knee.

At 6.00pm Lucy had a temperature of 100 degrees. I gave her another spoonful of Calpol and phoned the Out of Hours Service, Westdoc. I spoke with Dr. Kirby. She advised me to bring Lucy in. My husband, Neville left his work and met us at the Westdoc premises. Dr. Kirby examined Lucy at about 7.00pm and advised us to bring Lucy to Hospital, as she needed a drip. She assured us that there was nothing to worry about and that Lucy would be fine in the morning.

We arrived at the Erne Hospital at around 7.20pm where Lucy was admitted to the Children's Ward. We were shown to a cot but Lucy sat on my husband, Neville's knee.

Dr. Malik arrived and observed Lucy, while a nurse took Lucy's details, weighed her and attached a bag for a urine sample. We asked Dr. Malik to check her eyes. He shone a light into her eyes and said she was okay. At his request I carried Lucy into the treatment room. Dr. Malik commented that there was a lot of Gastroenteritis around. I told him that Lucy had no diarrhoea. He asked us who else in the house had gastroenteritis but I told him that no one had.

Dr. Malik put some anaesthetic cream on Lucy's hand and foot. I asked Neville to get Lucy a drink and he returned with some Juice. Nurse Swift took Lucy's temperature, which was 39.2°. Nurse Swift pricked Lucy's thumb for a sample. Meanwhile Dr. Malik looked for veins in Lucy's hands and foot. He tried unsuccessfully at least 11 times to connect into a vein. Nurse Swift and Dr. Malik did not seem alarmed. They chatted to each other about their weekend and Dr. Malik's trip to England. I voiced my concerns for Lucy because she was not crying and was floppy. I thought she was quite hot and asked for a thermometer to take her temperature again. It was still raised but Nurse Swift said she could not give her paracetamol until after the drip was inserted. Nurse Swift and Dr. Malik continued to talk among themselves. I indicated that I wanted bloods, etc. checked but I was told by Nurse Swift that it would be morning before any tests could be checked as the lab was closed. Eventually Dr. Malik muttered something to the effect that Lucy would have to go theatre to get the IV line inserted. He then left the room.

At approximately 8.50pm Dr. O'Donohoe arrived into the treatment room. He looked at Lucy and put on more anaesthetic cream. Dr. O'Donohoe left the room and returned a short time later with a bottle of glucose and a cup of juice. I gave Lucy the bottle and she drank all of it. Dr. O'Donohoe said that he would have to wait until the cream had taken effect. Neville then took Lucy and sat with her in the main waiting area of the Children's ward. On Dr. O'Donohoe's return, we brought Lucy back to the treatment room again. On his second attempt, Dr. O'Donohoe inserted a drip into Lucy's right hand. This was at approximately 10.30pm. Dr. O'Donohoe then left the ward.

Lucy was then given a paracetamol suppository and I carried her back to the cot, while Nurse Jones wheeled the drip counter and brought a cup of juice. Lucy was quiet and sleepy.

At about 11.00pm Lucy's older sister came in to the Children's Ward. I said to Lucy, "Look Lucy there's your sister". There was no response from Lucy, her eyes were staring as if she was looking through her, as if she did not know her big sister. We told a nurse about this but she said nothing. Dr. Malik arrived and we asked him to look at her eyes because they looked glassy. He shone his pen light into her eyes, said she was okay and walked away. This was the last time Lucy was seen by a Doctor until 3.00am.

Lucy closed her eyes and I thought she was sleeping. When Neville and my elder daughter left a nurse came over and said she was going to give me a bed opposite to rest in but that if they needed it during the night, I would have to rest in a chair. While she was doing this, Sister Edmundson came and spoke to me and then left. A Nurse came with a cup of tea for me and I sat on the edge of the bed and watched Lucy sleeping.

At about 12.15am on Thursday 13th April, 200 Lucy became a little restless. I sat her up and then she vomited. I took off her pyjama bottoms and cleaned her. I then walked up the ward to find a Nurse to ask for a clean sheet. Nurse Jones told me not to put pyjamas on Lucy. Lucy was sleeping.

At 2.15am Lucy had a bowel movement, which frightened me. It was runny, green and foul smelling. I rang the bell and Nurse McCaffrey came and helped me clean Lucy. I said to her "What on earth is that?" She said she didn't know and asked me if I had any nappies. Nurse McCaffrey was not alarmed. She took the nappy and its contents away and returned a few minutes later saying that Lucy was going to be moved into a side ward because of the risk of infection to the other patients in the ward. Lucy was sleeping again. Lucy and I were moved into a side ward at the end of the ward and left on our own. I was sitting watching her, she was quiet and sleeping.

Just before 3.00am, Lucy moaned a little and started to breath loudly for 3-4 breaths. Her body twitched, her eyes were flickering, her body rigid and I noticed that her hands were clenching backwards and tight fisted. I called her by name and tried to open her hands but I could not. I rang the bell but no one came. I left the side ward and shouted up the ward.

Nurse McCaffrey appeared. She came to Lucy's door and shouted. I lifted Lucy but she did not respond to me. Nurse McManus and Nurse Jones came into the room with equipment and started to give Lucy oxygen. Nurse McCaffrey stood and did not know what to do. I asked what was wrong but no one answered me.

Dr. Malik then came into the room followed by Dr. O'Donohoe and Dr. Auterson. No-one told me what was happening. Neville and my elder daughter arrived. Dr. Auterson was trying to insert some equipment, a pipe or drain, but couldn't because he did not have the correct ones. Nurses were running to get what they didn't have on the trolleys, it seemed that they did not know what or recognise the name of the equipment that Dr. Auterson was looking for. Dr. Auterson was obviously frustrated and said he needed a smaller line. He then, in no uncertain terms, told me to get out of the room.

I sat outside the room with Neville, my elder daughter and my parents whom I had rung. There was a lot of commotion in and out of the room. Nurses were running with pieces of equipment, which had to be brought from other areas of the hospital. Sister Edmundson, who was on duty, arrived and I asked her what was happening. She said they were working with Lucy.

At 3.35am Sister Edmundson told us they were moving Lucy to the Intensive Care Ward. At no time did anyone approach us to tell us of Lucy's condition.

We sat around until 5.30am. A Nurse came and said they had stabilised Lucy and were sending her to the Royal Belfast Hospital for Sick Children for a scan. I said I wanted the scan to take place in Enniskillen but she told me that the Royal would be better able to treat Lucy. We went in to an office and asked Dr. Auterson and Dr. O'Donohoe how Lucy was. We asked that Lucy be airlifted to the Royal but we were told that this did not happen.

Dr. Auterson said Lucy would not be leaving the Erne Hospital, Enniskillen until 9.00am due to the fact there was no one to cover him. We were not happy about this and asked for him to ring another doctor who was on leave, but he said he could not

do this. Dr. Auterson was my Anaesthetist when Lucy was born by Caesarean Section 17 months earlier.

Dr. Auterson then made a phone call and we were then told that Dr. O'Donohoe would accompany Lucy in the ambulance to Belfast and they would be leaving shortly. Lucy, Dr. O'Donohoe and a nurse left in the ambulance at 6.40am. I was not allowed to travel with Lucy in the ambulance.

We travelled to the Royal in our own car. At about 10.00am the Doctors spoke to us frankly and compassionately. They explained that Lucy's condition was very serious. They did not give us any hope. They said that they could do nothing with a dead baby. Dr. Crean expressed his anger and frustration that Lucy's notes had still not come through from the Erne Hospital in Enniskillen. Unfortunately Lucy's condition did not improve through the day. At about 6.00pm Dr. Hanrahan explained they would carry out Brain Stem tests the next morning.

On Friday 14th April 2000 Dr. Hanrahan and Dr Chisakuta brought us in to their office after they had carried out the tests and told us they were negative. They advised us that they had no alternative but to take Lucy off the ventilator and she was taken off at about 1.00pm.

Dr. Hanrahan told us that we should seek answers from the Erne as to what had happened to Lucy.

My husband and I met Dr O'Donohoe in May 2000, one month after Lucy's death. We asked him various questions surrounding Lucy's death. He said 'he did not know' or 'did not understand it'. Dr O'Donohoe did not have Lucy's notes with him. He said he had given them to Dr Kelly to check. We were left feeling totally deflated and in the dark surrounding the circumstances in which Lucy died.

We then contacted the Western Health and Social Services Council and worked with Mr Stanley Millar, the Chief Officer at the time. We invoked the Sperrin Lakeland Health & Social Care Trust complaint procedure by letter dated 22nd September 2000. We were told by Mr Millar that we would be provided with a written explanation of what happened within twenty days. We received a letter dated 30th March 2001 from the Chief Executive of the Sperrin Lakeland Health & Social Care Trust stating that 'the outcome of our review has not suggested that the care provided to Lucy was inadequate or of poor quality'.

Looking back we feel we were not listened to and side lined in every way. It always seemed that everyone was avoiding the most important issue, what happened to Lucy? As of today, we still have not received an explanation from the Sperrin Lakeland Health & Social Care Trust or any of its employees as to what did happen to Lucy or what caused her death.

We had high hopes that the complaint procedure would provide us with the answers. As a result of the unsatisfactory nature of the outcome we felt that we had no alternative to instruct our Solicitor, Mr Murnaghan, who has worked tirelessly for us three and half years.

We are all human, mistakes are made, apologies are given and appropriate measures are put in place to ensure such events never recur. Instead we feel the Sperrin Lakeland Health & Social Care Trust have tried to brush Lucy's death under the carpet. We feel that doors have been firmly shut in our faces and swung open only to provide information when required as a result of legal action.

We feel our little girl, Lucy was totally let down by the Sperrin Lakeland Health & Social Care Trust. Lucy had been placed in their care and they were responsible for her. We feel that the acts and omissions of the Trust caused Lucy's death. We feel that the acts and omissions of the Trust since Lucy's death have caused us greater pain and suffering. The Trust has not been able to deal appropriately with the consequences of Lucy's death. In this instance what is supposed to be 'the caring profession' have in my book become 'the uncaring profession'.

Lucy's death has had a profound, debilitating and devastating affect on her sister, brother, father and myself. Lucy was a very special little girl and important member of our family. We miss her terribly.

I wish it to be made known that I hold the Sperrin Lakeland Health & Social Care Trust wholly accountable and fully responsible for Lucy's death.

Whilst the ventilator and tubes were disconnected in the Royal Belfast Hospital for Sick Children on Friday 14th April, 2000, my little girl died in a side room in the children's ward of the Erne Hospital, Enniskillen on Wednesday 12th April, 2000.

We were never given the underlying cause of the cerebral oedema.

Mr. Good: I felt Nurse ~~Quinn~~ Swift and Dr. Mohan were not concentrating on Lucy. I later became aware that the lab was open during the night. At times there were a number of people in the side-room where Lucy was. The nurses could not locate certain equipment and Dr. Anderson became very frustrated. At no stage did the nursing staff tell us what was going on. They were very busy.

Mr. Fee: After Lucy's death I attempted to find out what happened. I received the conclusions of the Review the Trust later carried out. A Mr. Quinn of Altnagelvin was asked to make an assessment. A copy of that report was not provided. We instructed Dr. Evans & Swanson to prepare a report

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on the day
of 20, at inquest touching the death of
, before me

Coroner for the District of

as follows to wit:—

The Deposition of MAE ELIZABETH CRAWFORD

of

(Address)

who being sworn upon his oath, saith

He was our expert in relation to civil
proceedings. No explanation of husband's
death was ever provided. The civil
proceedings were settled. M. Crawford.

The Witness Concerned: Mae Elizabeth Crawford

We were never given the underlying cause of the Cerebral Oedema.

Mr Good: I felt Nurse Swift and Dr. Malik were not concentrating on Lucy. I later became aware that the lab was open during the night. At times there were a number of people in the side-room where Lucy was. The nurses could not locate certain equipment and Dr Auterson became very frustrated. At no stage did the nursing staff tell us what was going on. They were very busy.

Mr Fee: After Lucy's death I attempted to find out what happened. I received the conclusions of the review the Trust later carried out. A Mr Quinn of Altnagelvin was asked to make an assessment. A copy of that report was not provided. We instructed Dr Evans of Swansea to prepare a report. He was an expert in relation to civil proceedings. No explanation of Lucy's death was ever provided. The civil proceedings were settled.

Form 20

CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on TUESDAY the 17th day of FEBRUARY 2004, at inquest touching the death of LUCY CRAWFORD, before me MR. J L LECKEY Coroner for the District of GREATER BELFAST as follows to wit:-

The Deposition of NEVILLE CRAWFORD of [REDACTED] who being sworn upon her oath, saith

Our daughter Lucy Crawford was born on 5th November 1998 at the Erne Hospital, Enniskillen. She was our third child and was a good deal younger than our other two children.

On Monday 10th April 2000 I was working the late shift from 5-10pm. Lucy went to our babyminders as normal. At 10.15pm I returned from work and everything seemed ok.

On Tuesday 11th April 2000 I went to work at about 11.30am. At 1.00pm Mae rang me to work to say that Lucy had been sick. I arranged to meet Mae and Lucy in the car park at the Erne Health Centre at 2.30pm. I carried Lucy into Dr. Graham's waiting room. The Doctor examined Lucy and said he could not see anything wrong and that there was nothing to worry about. I returned home with Mae and Lucy and later returned to work at about 3.30pm. I finished work at 10.00pm and Lucy was in bed when I returned home.

At 8.00am the next morning Lucy was not great. She was just sitting about. We decided that Mae would go on to work and I would stay at home with Lucy. During the morning Lucy took small drinks of water on a couple of occasions and also ate 2 Ritz biscuits. At 1.00 pm Mae returned from work and I left to bring the car to the garage.

I went to work at 5.00pm. At about 6.30pm Mae rang to say she was bringing Lucy to the out-of hours doctor. I met Mae & Lucy at Westdoc on the Tempo Road just after 7.00pm. Dr. Kirby was already checking Lucy, she said Lucy was dehydrated and would need to go to hospital to have a drip. She also said there was nothing to be alarmed about.

I brought Mae & Lucy to the Children's Ward at the Erne Hospital. Dr Malik checked Lucy. He tried unsuccessfully to set up a drip between 6 and 10 times. There was no reaction from Lucy. The Nurse then also tried to set up the drip.

At 9.25pm we were still waiting for the drip to be set up. I was carrying Lucy in my arms. One of the nurses answered a phone call and I overheard her saying "Not another one I've had enough of this. I'll make sure I'm not here tomorrow night". The tone of her conversation made me think there was another child being admitted and that she wasn't too pleased. This was the same nurse who had been working with Lucy a short time earlier.

By 10.30pm the drip had been set up and Lucy was put in bed back in the ward. I left to go home to our other children. At 11.00pm I returned to the Hospital with our older girl. At about 11.30pm I remarked to a nurse and to Mae that Lucy's eyes were very strange. She seemed to be looking at you but not making any reaction. The Nurse seemed unconcerned when we told her. At about 11.50pm I went home. I had arranged that I would return to Hospital at about 4am.

At 2.50am on the morning of 13th April 2000 the phone rang. I was sound asleep. A Nurse told me that Lucy had taken a slight turn but not to be alarmed. I knew in my heart that they wouldn't have rung unless it was serious. My elder daughter came into my room as the phone had wakened her and said, "What's wrong Daddy?" I told her we had to go to the hospital.

I drove as quickly as possible to Hospital and I passed Dr. O'Donohoe driving his own car on the way to Hospital.

I arrived at the ward at about 3.20am. I saw Lucy and to me she seemed to be dead. The Doctors and Nurses were panicking. Nobody seemed to know what to do. It was chaos. A Doctor would ask a nurse to get a piece of equipment and the nurse would return but with the wrong piece of equipment. Nothing seemed to be working. We were ordered out of the room. Dr. O'Donohoe arrived. There seemed to be a lot of doctors and nurses working with Lucy. Lucy was transferred to Intensive Care. There was no child's ventilator available so Lucy had to be put on adult ventilator.

At 6.30am Lucy was transferred by ambulance to Royal Belfast Hospital for Sick Children. At 8.00am Mae and I arrived at the Royal with our other two children.

At about 10.00am we spoke to the Doctors at the Royal. They explained that Lucy's situation was very serious. There seemed to be problems obtaining Lucy's notes from the Erne Hospital in Enniskillen.

Nothing Changed in Lucy's condition during day and at about 6.00pm Dr. Hanrahan explained they would be doing Brain Stem tests the next morning. Those tests proved negative and as a result Lucy was removed from the ventilator and died a short time later.

W - N. R. H. A.

h. Hanrahan

17/2/04

CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on the FEBRUARY, at inquest touching the death of LUCY CRAWFORD, before me MR J L LECKEY Coroner for the District of GREATER BELFAST as follows to wit:-

The Deposition of DR AISLING KIRBY

of who being sworn upon HER oath, saith

I, Aisling Kirby, am a registered General Practitioner and have been practising at 75 Main Street, Derrylin for the past thirteen years. I was "on-call" for WESTDOC at Tempo Road, Enniskillen on the evening of 12 April 2000 from 18.00-24.00hrs. I recall seeing Lucy that evening for what I believe was the first and only time. The typed record from Westdoc show that a contact was made on Lucy's behalf at 18.38. As a result, either myself or the GP on duty with me would have phoned Lucy's parents back to get the details of the problem. The typed record does not say which doctor made the call and I personally do not recall. The message received however was that Lucy was "unwell all weekend – vomited yesterday and today – spiking temps – breathing quite fast – has slept all day." They were advised to bring Lucy to the centre for examination. The typed record, records that my consultation with Lucy and her family began at 19.25 and ended at 19.46 hrs. I ascertained from her Mum that Lucy was not drinking, that she was lethargic and that she had a temperature, which was not responding to Calpol. On examination Lucy was drowsy and "floppy" in her Mother's arms.

Temperature: 38 degrees

Heart rate: 120/min

Respiratory Rate: 60/min

The mucosa of her mouth was moist. Examination of her ears, throat, heart, lungs and abdomen was entirely normal. As I could not find any

localizing signs, I queried that she could well have a Urinary Tract Infection. I arranged her admission to Children's Ward at the Erne Hospital. Reasons for admission on the referral letter: "needs fluids." *she had not been drinking, she was vomiting and drowsy etc*
had a temperature.
TAKEN before me this

Aisling Kelly

M. L. Kelly

Coroner for the District of Greater Belfast

11/2/84

CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on TUESDAY the 17TH day of FEBRUARY 2004, at inquest touching the death of LUCY CRAWFORD, before me MR J L LECKEY Coroner for the District of GREATER BELFAST as follows to wit:-

The Deposition of DR PETER CREAN of ROYAL BELFAST HOSPITAL FOR SICK CHILDREN, GROSVENOR ROAD, BELFAST, BT12 6BA who being sworn upon his oath, saith

I am a registered medical practitioner and was appointed to the Royal ~~Victoria~~ ^{BELFAST} Hospital for Sick Children as a consultant in paediatric anaesthesia and intensive care in 1984. I qualified from Queen's University, Belfast and my qualifications are MB, BCH, BAO, FFARCSI.

This is a report of my involvement in the care of Lucy Crawford. I looked after her in the Paediatric Intensive Care Unit, Royal Belfast Hospital for Sick Children on Thursday 13th April 2000.

Lucy Crawford was a 17 month old girl who was transferred from the Erne Hospital in the early hours of Thursday 13th April 2000 to the Paediatric Intensive Care Unit in the Royal Belfast Hospital for Sick Children. She had a history of being unwell since Tuesday, and was admitted to the Erne Hospital on the Wednesday evening with a history of poor oral intake, vomiting and an increased temperature. Her Sodium level on admission was 137mmol L. She was given intravenous fluids in the ward, however at 03.00 hours on 13th April 2000 she developed a seizure and was give rectal diazepam. Also her breathing became erratic and she stopped breathing. Her sodium level at this time was 127mmol L. It was necessary for Lucy to be intubated and ventilated. It was noted that before leaving the Erne Hospital her pupils were dilated and unreactive.

On arrival at the Children's Hospital she was mechanically ventilated and soon required drugs to maintain her blood pressure. Her sodium level after arrival was 145mmol/L. She remained completely unresponsive and I was able to change her breathing tube without the aid of any medications. I arranged for her to be seen by Dr Hanrahan, Consultant Paediatric Neurologist in the Children's Hospital. Sadly Lucy died the following day, 14th April 2000. At the time she was under the care of my consultant colleague, Dr Chisakuta.

From the time of her arrival in the children's Hospital there was no chance that she would survive. I cannot remember what water accompanied Lucy from the Erne. On admission to the Erne her sodium level was within normal limits. It then dropped 10 to 127 within a short period. The rate of fall is the crucial factor. The dilated & unresponsive pupils indicated some catastrophic event to the brain. I believe that at the time Lucy left the Erne hospital the situation was not retrievable. Children can deteriorate very quickly - more so than adults. 145 is at the upper range for normal sodium levels. That may have been due to the fluids she had been infused with at the Erne or possibly diabetes insipidus. On admission the working diagnosis was ~~fastonkerikie~~. My formulation of the cause of death would be 1(a) cerebral oedema due to 1(b) HYPONATRAEMIA.

TAKEN before me this 17TH day of FEBRUARY 2004

M. H. Corley

Coroner for the District of Greater Belfast

DHSSPS

006-001-055

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on the day
of 20, at inquest touching the death of
, before me

Coroner for the District of

as follows to wit:—

The Deposition of DR. PETER CLEAN

of

who being sworn upon his

oath, saith

(Address)

Managing ill children is very difficult.
Fluid therapy needs to be monitored
along with all therapies involving
children. The foul bowel motion may have
indicated some underlying gastroenteritis.
Mr. Good: Lucy had been weighed on
admission to RBHSC 8 a.m. on 13th April
- 9.8 kgs. (Nurse B. Murphy). The fluid
record for 9 a.m. - 9 p.m. on 13th April
shows IV 1183, output 680. 9 p.m. on 13th
for next 12 hours shows IV 451 & output
265. DDAVP was administered on 13th - it
is for diabetes insipidus. It was given on 3
occasions that day 10.30, 11.30 & 13.20.
It was not administered on the following day.
After 9 a.m. on 14th until midday
IV 181 and 132 out.

Mr. Fee: (Expression of gratitude on behalf
of the parents). By the time Lucy was
transferred her condition was irretrievable.
It would have been important to have had
the fluid management records from the time
Lucy had been in another hospital & as much
information as possible was essential. I
was frustrated not to have the records.

P.T.O.

006-001-056

DHSSPS

They could have been faxed or information given by telephone. Open the paper record entries with the patient. The drop from 137 to 127 would ring alarm bells. There is no reason why information cannot be faxed. Fluid charts from Eme are with the medical records ^{at the RBHSC} ~~at the~~ 100 ml per hour 11 p.m. on 12th April to 2 a.m. on 13th. At 3 a.m. the fluid was changed from No 18 to normal saline. It was not the fluid management that I would advocate. The record from the Eme does not contain any formula for fluid management. It was wrong to use No 18 for both replacement and maintenance purposes. So far as I am concerned the major issue relates to the appropriate fluids for the deficits. ~~see~~ Using only one fluid - No 18 - had the potential to lead to hyponatraemia. One fluid for deficit, one for maintenance + monitoring. * There is no evidence that the problem was approached in that way at the Eme. Fluid management for Lucy was inappropriate.

Mr. Good: The fluid management chart arrived at RBHSC at 8.53 p.m. on 13th April. T. Spelman

DHSSPS

TAKEN before me this 17th day of February 2004

h. h. Bentley Coroner for the District of Greater

006-001-057

The Witness Concerned: Dr Peter Crean of Royal Belfast Hospital for Sick Children

From the time of her arrival in the children's Hospital there was no chance that she would survive. I cannot remember what notes accompanied Lucy from the Erne Hospital. On admission to the Erne Hospital her sodium level was within normal limits. It then dropped 10 to 127 within a short period. The rate of fall is the crucial factor. The dilated and unreactive pupils indicated some catastrophic event to the brain. I believe that at the time Lucy left the Erne Hospital the situation was not retrievable. Children can deteriorate very quickly – more so than adults, 145 is at the upper range for normal sodium levels. That may have been due to the fluids she had been infused with at the Erne Hospital or possibly Diabetes Insipidus. On admission the working diagnosis was Gastroenteritis. My formulation of the cause of death would be 1(a) Cerebral Oedema due to 1(b) Hyponatraemia.

Managing ill children is very difficult. Fluid therapy needs to be monitored along with all therapies involving children. The food bowel motion may have indicated some underlying Gastroenteritis.

Mr Good: Lucy had been weighed on admission to Royal Belfast Hospital for Sick Children 8.00 am on 13th April 2000 – 9.8 KGs (Nurse B Murphy). The fluid record for 9.00 am – 9.00 pm on 13th April 2000 shows IV 1183, output 680 (9.00 pm on 13th for next twelve hours shows IV 451 and output 265. DDAVP was administered on 13th April – it is for Diabetes Insipidus. It was given on three occasions that day, 10.30, 11.30, and 13.20. It was not administered on the following day. After 9.00 am on 14th April until midday IV 181 and 132 output.

Mr Fee: (Expression of gratitude on behalf of the parents)

By the time Lucy was transferred her condition was irretrievable. It would have been important to have had the fluid management record from the Erne Hospital. Lucy had been in another hospital and as much information as possible was essential. I was frustrated not to have the records. They could have been faxed or information given by telephone. Often the paper record arrives with the patients. The drop from 137 to 127 would ring alarm bells. There is no reason why information cannot be faxed. Fluid sheets from the Erne Hospital are with the medical records of the Royal Belfast Hospital for Sick Children 100 mls per hour from 11.00 pm on 12th April to 2.00 am on 13th April. At 3.00 am the fluid was changed from No. 18 to normal saline. It was not the fluid management that I would advocate. The record from the Erne does not contain any formula for fluid management. It was wrong to use No 18 for both replacement and maintenance purposes. So far as I am concerned the major issue relates to the appropriate fluids for the deficits. Using only one fluid – No 18 – had the potential to lead to Hyponatraemia.

DHSSPS

006-001-058

One fluid for deficit, one for maintenance and monitoring. There is no evidence that the problem was approached in that way at the Erne. Fluid management for Lucy was inappropriate.

Mr Good: The fluid management chart arrived at Royal Belfast Hospital for Sick Children at 8.53 am on 13th April 2000.

DHSSPS

006-001-059

Received pursuant to Rule 17

Department of Health, Social Services & Public Safety
An Roinn Sláinte, Seirbhísí Sóisialta agus Sábháilteachta Poiblí

From The Chief Medical Officer:
Dr Henrietta Campbell CB

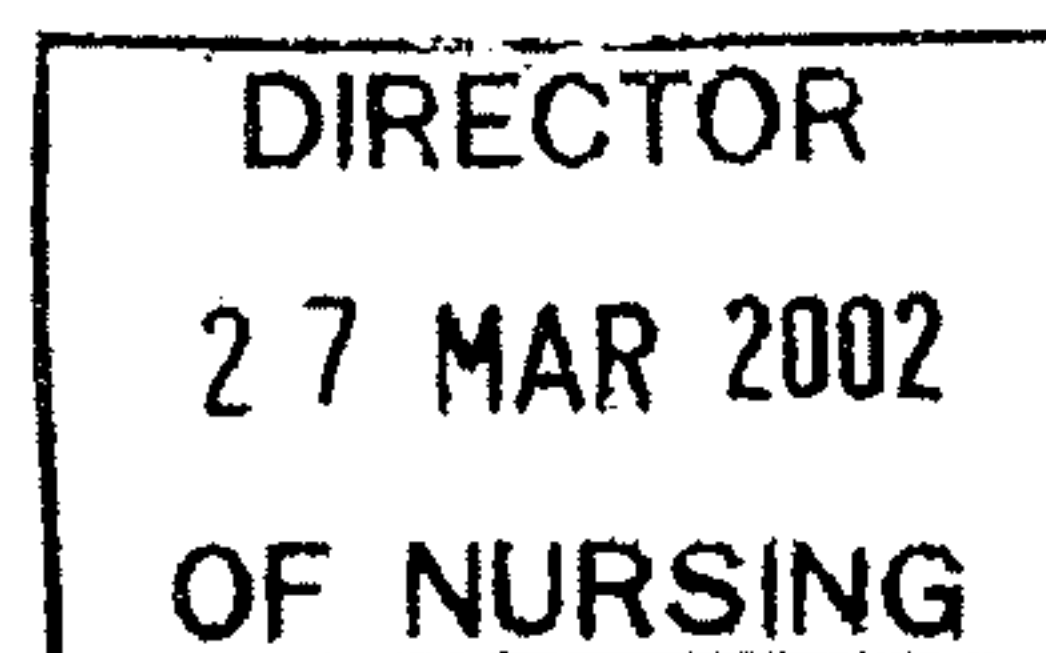
Castle Buildings
Upper Newtownards Road
Belfast BT4 3SJ

Telephone: [REDACTED]
Fax: [REDACTED]

E-Mail: henrietta.campbell [REDACTED]

Medical Directors of Acute Trusts
Directors of Nursing in Acute Trusts
Consultant Paediatricians
Consultant Surgeons
Consultant Neurosurgeons
Consultant Anaesthetists/Intensivists
Consultants in Plastic Surgery/Burns
Consultants in A&E Medicine
Consultant Pathologists

25 March 2002



Dear Colleagues

PREVENTION OF HYPONATRAEMIA IN CHILDREN

Guidance on the Prevention of Hyponatraemia in Children has been published and will be forwarded to you under separate cover. It has been prepared as an A2 sized poster and I ask you to ensure that the posters are prominently displayed in all units that may accommodate children. The Guidance has been developed by a multidisciplinary working group established by the Department and the work has been supported and endorsed by CREST.

Hyponatraemia can be extremely serious and has in the past few years been responsible for two deaths among children in Northern Ireland. Hyponatraemia is a problem of water balance and most often reflects the failure to excrete water. Stress, pain and nausea are all potential stimulators of the antidiuretic hormone ADH which inhibits water excretion.

Any child receiving IV fluids or oral rehydration is potentially at risk of hyponatraemia. The administration of excess or inappropriate fluid to a sick child may result in serious or life threatening hyponatraemia. There is a particular concern about the use of 0.18% Sodium Chloride in Glucose among children as it has been implicated in cases of hyponatraemia. While it may pose a risk because of the relatively low sodium content no specific fluid is without risk. This has been emphasised in a recent letter received from the Medicines Control Agency which stated that while hyponatraemia is a risk with 0.18% Sodium Chloride, electrolyte imbalance is a risk with all intravenous solutions.

The Guidance emphasises that every child receiving intravenous fluids requires a thorough baseline assessment, that fluid requirements must be calculated accurately and fluid balance must be rigorously monitored. Following this simple advice will prevent children from developing hyponatraemia.

The Guidance is designed to provide general advice and does not specify particular fluid choices. Fluid protocols should be developed locally to complement the Guidance and provide more specific direction to junior staff. This is particularly important in subspecialty areas such as renal medicine, burns units and



INVESTOR IN PEOPLE

neurosurgery. It will be important to audit compliance with the guidance and locally developed protocols and to learn from clinical experiences.

I would like to extend my thanks to all members of the multidisciplinary group who have worked together to provide clear and practical guidance to improve the care of sick children. The Guidance is also available on the Departmental website www.dhsspsni.gov.uk.

Yours sincerely



HENRIETTA CAMPBELL (Dr)

CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on TUESDAY the 17TH day of FEBRUARY 2004, at inquest touching the death of LUCY CRAWFORD, before me MR J L LECKEY Coroner for the District of GREATER BELFAST as follows to wit:-

The Deposition of DR EDWARD SUMNER MA, BM, BCh, FRCA – CONSULTANT IN PAEDIATRIC ANAESTHESIA, of [REDACTED]

who

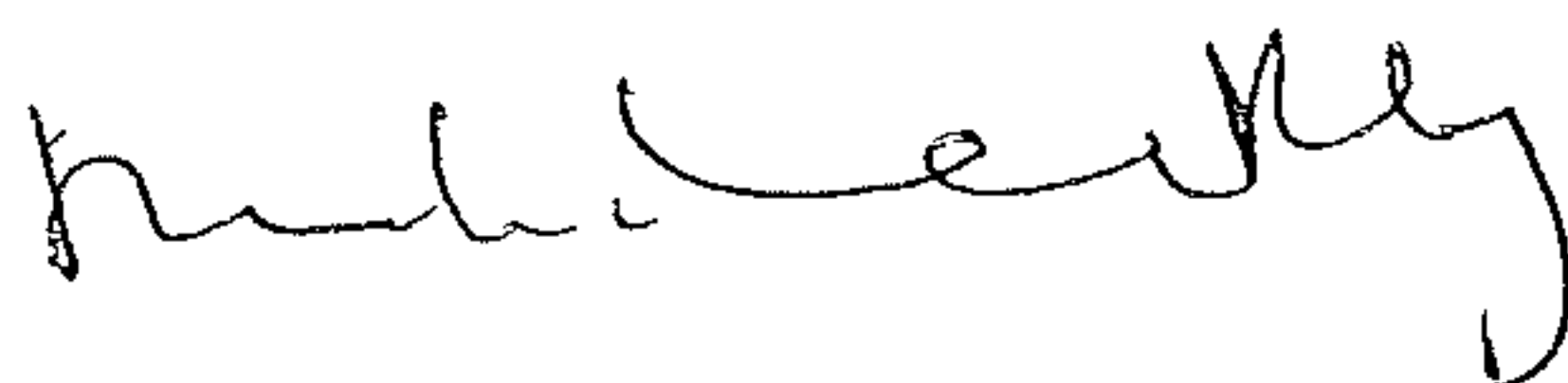
being sworn upon his oath, saith

On the instructions of H.M. Coroner for Greater Belfast, Mr J L Leckey, L.L.M., I prepared a report into the circumstances of the death of Lucy Crawford.

I now produce a copy of my report marked C1

My working diagnosis is *dehydrated*
hyponaemia leading to cerebral oedema.
If I was formulating the cause of death
I would put at 1(a) acute cerebral oedema
due to 1(b) hyponaemia and at
II Gastroenteritis.

TAKEN before me this 17TH FEBRUARY 2004



Coroner for the District of Greater Belfast

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on the day
of 20, at inquest touching the death of
, before me

Coroner for the District of

as follows to wit:—

The Deposition of DR. EDWARD SUMNER

of

(Address)

who being sworn upon his oath, saith

I am in agreement with Dr. Spear's evidence.
I am also in agreement with the basis
of the reports of Dr. Evans and Dr. Jenkins.
It is good practice to write down one's
thought processes. We should have been able
to see the thought processes. Prescriptions
should always be written down so that nurses
know what to do — if fluids are no different
to a prescription for antibiotics. The rate of
infusion was not written down and that
is crucial. Lucy had an acute viral
infection with vomiting, her tummy would
have been tender. She would have felt tired.
The brain swelling would have started
perhaps after the first hour / 100 ml of the
infusion. Adult's report headache and then
consciousness would have been dimmed.
I would have made an assessment of the
dehydration & on the basis of approx. body
weight would have calculated the fluid
deficit. I would have used a fluid such as
Hartmann's for deficit. The 18 solution for
maintenance would have been fine. There is not
one fluid but a range.

Mr. Good: The difference in Lucy's weight between admission & post-mortem is a puzzle. She weighed more when she arrived in Belfast than in the Erne. The extra 500ml of fluid was a great deal & made a difference. I believe she was given 900 mls of fluid ^{intravenously} and 100 orally in the Erne. 400 mls of dextrose saline could have triggered the problem. There is no evidence that at the Erne she was given more fluid than that recorded, i.e. a non-recording of fluids, (letter of Dr. Henrietta Campbell dated 25/3/02 produced). I think this letter is the first time the CMO expressed concerns.

Mr. Fee: Dilutional hyponatraemia has been known for a long time. Fluid management has for long been recognized as very important. The extent of dehydration should be assessed if possible and recorded. At the Erne signs of dehydration had been looked for but not noted down in a formal way. I believe it is good practice to record it - bad practice not to. All signs should be recorded. A fluid replacement formula should be devised & definitely recorded. Mandatory that the fluid prescription should be recorded on a properly designated chart. Solution(s) and rate(s). No contemporaneous note was made & no working calculation was made. The actual fluid regime used for Lucy was inappropriate. The use of 18 on the cannula was totally

TAKEN before me this 17th day of February 2004

M. L. Leckley ✓ Coroner for the District of Greater North. Ir

DHSSPS

006-001-064

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on _____ the _____ day
of _____ 20 _____, at inquest touching the death of _____
_____, before me

Coroner for the District of _____

as follows to wit:—

The Deposition of Mr Edward Sumner

of _____

(Address)

who being sworn upon his oath, saith

inappropriate - fine for maintenance
but not for deposit or ongoing losses. The
wrong solution and the wrong rate were
deployed. The rate intended by Dr O'Donohue
was misinterpreted from 100 ml at start & 20
thereafter to 100 throughout. There was
fundamental errors. Even if 18 solution
had been used but infused as Dr
O'Donohue intended Lucy may well have
survived. The error occurred whilst
Lucy was in the Erne. Probably the
brain was swelling for up to 2 hours
before the seizure. It was a fundamental
error to have changed the fluid at 3am.
and for the infusion to be free-running.
~~to a free-running fluid.~~ That
exacerbated the existing problem. From the
notes there is no evidence that the re-hydration
was monitored. Nursing staff would throughout
take the usual range of observations &
checking the child's welfare - usually half-
hourly. Here every 15 minutes is a factor.

E. Sumner

The witness concerned: **Dr Edward Sumner**

My working diagnosis is Dilutional Hyponatraemia leading to Cerebral Oedema. If I was formulating the cause of death I would put 1(a) Acute Cerebral Oedema due to 1(b) Hyponatraemia and II Gastroenteritis.

I am in agreement with Dr Crean's evidence. I am also in agreement with the basis of the reports of Dr Evans and Dr Jenkins. It is good practice to write down one's thought processes. We should have been able to see the thought processes. Prescriptions should always be written down so that nurses know what to do – fluids are no different to a prescription for antibiotics. The rate of infusion was not written down and that is crucial. Lucy had an Acute Viral Infection with vomiting, her tummy would have been tender. She would have felt tired. The brain swelling would have started perhaps after the first hour/ 100 units of the infusion. Adults report headache and then consciousness would have been dimmed. I would have made an assessment of the dehydration and on the basis of approximate body weight would have calculated the fluid deficit. I would have used a fluid such as Hartman's for deficit. The No 18 solution for maintenance would have been fine. There is not one fluid but a range.

Mr Good: The difference in Lucy's weight between admission and post mortem is a puzzle. She weighed more when she arrived in Belfast than in the Erne. The extra 500 mls of fluid was a great deal and made a difference. I believe she was given 900 mls of fluid intravenously and 150 orally in the Erne. 400 mls of dextrosoline could have triggered the problem. There is no evidence that at the Erne she was given more fluid than that recorded i.e. a non-recording of fluids, (letter of Dr Henrietta Campbell dated 25/03/02 produced). I think this letter is the first time the CMO expressed concerns.

Mr Fee: Dilutional Hyponatraemia has been known for a long time. Fluid management has for long been recognized as very important. The extent of dehydration should be assessed if possible and recorded. At the Erne signs of dehydration had been looked for but not noted down in a formal way. I believe it is good practice to record it – bad practice not to. All signs should be recorded. A fluid replacement formula should be devised and definitely recorded. Mandatory that the fluid prescription should be recorded on a properly designated chart. Solution(s) and rate(s), no contemporaneous note was made and no working calculation was made. The actual fluid regime used for Lucy was inappropriate. The use of No 18 on its own was totally inappropriate – fine for maintenance but not for deficit or ongoing losses. The wrong solution and the wrong rate were deployed. The rate intended by Dr O'Donohue was misinterpreted from 100 mls at start and 30 thereafter to 100 throughout. There were fundamental errors. Even if No 18 solution had been used but infused as Dr O'Donohue intended Lucy may well have survived. The error occurred whilst Lucy was in the Erne. Possibly the brain was swelling for up to 2 hours before the seizure.

It was a fundamental error to have changed the fluid at 3.00 am and for the infusion to be free running. That exacerbated the existing problem. From the notes there is no evidence that the re-hydration was monitored. Nursing staff would throughout take the normal range of observations and checking the child's welfare – usually half hourly. How busy the nurses are is a factor.

CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on TUESDAY the 17TH day of FEBRUARY 2004, at inquest touching the death of LUCY CRAWFORD, before me MR J L LECKEY Coroner for the District of GREATER BELFAST as follows to wit:-

The Deposition of DR DEWI EVANS - MB, FRCP, FRCPCH, Dobst - CONSULTANT PAEDIATRICIAN of DEPARTMENT OF CHILD HEALTH, SINGLETON HOSPITAL, SKETTY LANE, SWANSEA, SA2 8QA who being sworn upon his oath, saith

At the request of Murnaghan & Fee Solicitors, 37 Townhall Street, Enniskillen I prepared a report into the events leading to the death of Lucy Crawford.

I now produce a copy of my report as exhibit C 2

I agree with how Dr Sumner formulated the cause of death. I accept that the weighing of babies/toddlers may be inaccurate. On admission children should always be weighed. At 1(c) Excess dilute fluid. The notes showed that she had been given too much fluid anyway. The fluid was too dilute & the rate of infusion was too rapid. If she had more fluid than in the notes it would not have been a lot more. The very bad note-keeping is inexcusable. There was a breakdown in communication between the nursing & medical staff.

TAKEN before me this 17TH day of FEBRUARY 2004

Michael Leckey

Coroner for the District of Greater Belfast

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on _____ the _____ day
of _____ 20 _____, at inquest touching the death of _____
before me

Coroner for the District of _____

as follows to wit:—

The Deposition of DR. DEWI EVANS

of _____

who being sworn upon his

oath, saith

(Address)

Mr. Good: On admission to Eme Lucy's weight 9.1, at RBHC 9.8, I accept the fluid intake explains the difference. Probably the fluid intake in the Eme was accurate. The treatment of young children is difficult. I do not think the medical staff in the Eme addressed the dehydration issue adequately. I agree with Dr. Sumner or to about 5% dehydration. I have never used 18 solution in my practice in Lucy's circumstances. That solution is not used at all in my department. At no time would it have been reasonable to have used that solution. The lack of proper equipment did not affect the fatal outcome. When Lucy collapsed I do not believe the reaction of the medical staff was sufficiently prompt. My criticism is in part based on the statement of Mr Crawford.

Mr. Fee: Someone with Lucy's symptoms should not have been prescribed 18 solution. It should not have been used for dehydrated. It was a fundamental error to have used it. The rate of infusion was also a fundamental error as was the decision to change to 19 solution at a free-running rate. There is no record of the

P.T.O.

006-001-069

DHSSPS

matter referred to in para 44 having been
attended to. It should be mandatory to
have a written prescription as to fluid
management. The publication referred to
at para 37 is a book - first edition
published 1993. It states 'a solution for
dipicite. It deals with fluid replacement
therapy ^{generally}. I would be administered if there had
been a report not criticizing the care and
management of Lucy.

Murder

DHSSPS

TAKEN before me this 18th day of February 2004

L. L. L. - M. L.

Coroner for the District of ...

006-001-070

The witness concerned: Dr Dewi Evans

I agree with how Dr Sumner formulated the course of death. I accept that the weighing of babies/toddlers may be inaccurate. On admission children should always be weighed. At 1(c) Excess Dilute Fluid. The notes showed that she had been given too much fluid anyway. The fluid was too dilute and the rate of infusion was too rapid. If she had more fluid than in the notes it would not have been a lot more. The very bad note-keeping is inexcusable. There was a breakdown in communication between the nursing and medical staff.

Mr Good: On admission to Erne Hospital Lucy's weight 9.1 at Royal Belfast Hospital for Sick Children 9.8. I accept the fluid intake explains the difference. Probably the fluid intake in the Erne was accurate. The treatment of young children is difficult. I do not think the medical staff in the Erne addressed the dehydration issue adequately. I agree with Dr Sumner as to about 5% dehydration. I have never used No 18 solution in my practice in Lucy's circumstances. That solution is not used at all in my department. At no time would it have been reasonable to have used that solution. The lack of proper equipment did not affect the fatal outcome. When Lucy collapsed I do not believe the reaction of the medical staff was sufficiently prompt. My criticism is in part based on the statement of Mrs Crawford.

Mr Fee: Someone with Lucy's symptoms should not have been prescribed No 18 solution. It should not have been used for deficits. It was a fundamental error to have used it. The rate of infusion was also a fundamental error as was the decision to change to No 9 solution at the free running rate. There is no record of the matters referred to in paragraph 44 having been attended to. It should be mandatory to have written prescription as to fluid management. The publication referred to at paragraph 37 is a book-first edition published 1993. It states No 9 solution for deficit. It deals with fluid replacement therapy generally. I would be astonished if there had been a report not criticising the care and management of Lucy.

DHSSPS

006-001-071

CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on TUESDAY the 17TH DAY OF FEBRUARY 2004, at inquest touching the death of LUCY CRAWFORD, before me J L LECKEY Coroner for the District of GREATER BELFAST as follows to wit:-

The Deposition of DR T AUTERSON

of ERNE HOSPITAL, ENNISKILLEN who being sworn upon his oath, saith

I was the on-call anaesthetist on the night of Wednesday 12th April 2000. At approximately 03.40 on Thursday 13th April I was phoned by switchboard and told I was needed urgently in the Childrens Ward – no reason was given. I arrived in Childrens Ward shortly after 03.50, to find a child in a side ward being manually ventilated by Dr J O'Donohue. I was told that the child had been admitted the previous evening with vomiting, and had had some offensive diarrhoea – presumptive diagnosis being gastroenteritis. There was a cannula in the right hand or arm and intravenous fluids were being administered. The child was pale and unresponsive. Apparently at about 03.00 the child had had some type of fit and was noted to have gone rigid. However, I was informed that at no time was the pulse absent and cardiac arrest had not occurred. The child had had a pyrexia of 38 – 39 and there was a query febrile convulsion. I took over hand ventilation from Dr O'Donohue and noted that the pupils were fixed and dilated and unresponsive to light. I then proceeded to intubate the child with a Portex 4.5mm uncuffed endotracheal tube, which was secured with tape and manual ventilation resumed with 100% O₂. The child had been given rectal diazepam 2.5 mg after the "fit", so I asked for 100 microgram of Flumazenil (Anexate) to be given intravenous – there was no improvement in neurological status or level of unconsciousness. Throughout all this, the B.P was stable at between 80/50 and 90/60 and there was a sinus tachycardia of 130 – 135/min. SaO₂ was

This information was given orally & not in writing.
98-100%. U&E Na127, K+2.5 – Query when sample taken? A portable chest x-ray and abdominal x-ray revealed what I thought was a normal chest and lung fields (no signs of aspiration), but the stomach and bowel were dilated with gas. I passed a small bore oro-gastric tube to deflate the stomach (undoubtedly filled with air due to the manual ventilation earlier.) This child needed CT scan of brain and a paediatric Intensive Care Unit – a bed in P.I.C.U at the Royal Belfast Hospital for Sick Children (RBHSC) was arranged. In the meantime, I decided to bring Lucy to our Intensive Care Unit for stabilisation etc. prior to transfer. Unfortunately we had no paediatric ventilator suitable for a 17-month old child who weighed approx 9kgs, but with some difficulty I was able to ventilate the child on a Puritan Bennett adult ventilator (VT200-f20, FiO2 1.0). Despite the fact that the BP was 80/50 and heart rate was 80-90, I was unable to palpate any peripheral pulses and was unsuccessful in cannulating either femoral artery. I did not insert a central line, due to the lack of recent experience with patients of this size – however the peripheral IV line was satisfactory. At this stage I replaced the oral ETT with a nasal ETT of the same size, without difficulty in order to make the airway more secure during transport to RBHSC. Also 25 mls 20% Mannitol was given slowly intravenous and an intravenous antibiotic was given. None of my colleagues were available to cover me in the event of my going to RBHSC with the child. Fortunately, Dr Ashgar Staff Grade Paediatrics was available to cover Dr O'Donohue Consultant Paediatrician who travelled with Lucy to Belfast. The child remained haemodynamically stable and at no point during the above became hypoxic. The ambulance arrived at approximately 06.10. The ambulance left the Erne with Lucy, Dr O'Donohue who provided manual ventilation with an Ambu Bag and an ICU nurse, at approximately 06.30. At approximately 08.30 I rang RBHSC P.I.C.U and was informed that Lucy had arrived safely and was being stabilised on a ventilator. Sadly there had been no improvement in neurological status and this persisted until approximately 12.00 the next day (Friday 14th April) when brain stem death was confirmed and ventilation was discontinued. This is as accurate a description of events that I can remember.

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on the day
of 20, at inquest touching the death of
, before me

Coroner for the District of

as follows to wit:—

The Deposition of DR. T. AUTERSON

of

who being sworn upon his

oath, saith

(Address)

Since Lucy's death we now have a paediatric ventilator. I do not know if the new hospital will have a PICU — it is not an acceptable situation. If a paediatric ventilator is essential then a rapid transfer to RBHSC would be required. I agree with Dr. Green that to all intents and purposes Lucy died in the Erne. The transfer to Belfast could not have commenced until someone was available to provide cover for myself or Dr. O'Donohue. It would not have made any difference which one of us travelled with Lucy. Dr. O'Donohue was the transfer physician and provided the RBHSC with a clinical summary. Initially hyponatraemia did not occur to me though it did later when I got lab results. On the ward fluid management is the responsibility of the surgeon or physician in charge — sometimes in consultation with the anaesthetist. I agree that in Lucy's case too much of the wrong fluid was given, I agree that the wrong fluid was given & that the rate of infusion was wrong.

Mr. Fee : The wrong fluid was given, too much of it was given and the rate of infusion should have been regulated. Lucy's care was not up to standard. When I arrived I agreed we frustrated that the equipment I needed was not being provided. There were some difficulties.

Mr. Todd : The pediatric ventilator was provided about a year after Lucy's death. During resuscitation there was organized chaos in the side-ward. Mr & Mrs Crawford were becoming distressed. I may have appeared firm. Resuscitation procedures are not pleasant.

Mr. Anterson

DHSSPS

TAKEN before me this 18th day of February 2004

in 11 - m a Coroner for the District of Greater

006-001-075

The witness concerned: Dr T Auterson

Since Lucy's death we now have a paediatric ventilator. I do not know if the new hospital will have a PICU – it is not an acceptable situation. If a paediatric ventilator is essential then a rapid transfer to Royal Belfast Hospital for Sick Children would be required. I agree with Dr Crean that to all intents and purposes Lucy died in the Erne. The transfer to Belfast could not have commenced until someone was available to provide cover for myself or Dr O'Donohue. It would not have made any difference which one travelled with Lucy. Dr O'Donohue was the transfer physician and provided the RBHSC with a clinical summary. Initially Hyponatraemia did not occur to me though it did later when I got the results. On the ward fluid management is the responsibility of the surgeon or physician in charge – sometimes in consultation with the anaesthetist. I agree that in Lucy's case too much of the wrong fluid was given. I agree that the wrong fluid was given and that the rate of infusion was wrong.

Mr Fee: The wrong fluid was given, too much of it was given and the rate of infusion should have been regulated. Lucy's care was not up to standard. When I arrived I agree I was frustrated that the equipment I needed was not being provided. There were some difficulties.

Mr Good: The paediatric ventilator was provided about a year after Lucy's death. During resuscitation there was organised chaos in the sideward. Mr & Mrs Crawford were becoming distressed. I may have appeared firm. Resuscitation procedures are not pleasant.

CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on TUESDAY the 17TH DAY OF FEBRUARY 2004, at inquest touching the death of LUCY CRAWFORD, before me J L LECKEY Coroner for the District of GREATER BELFAST as follows to wit:-

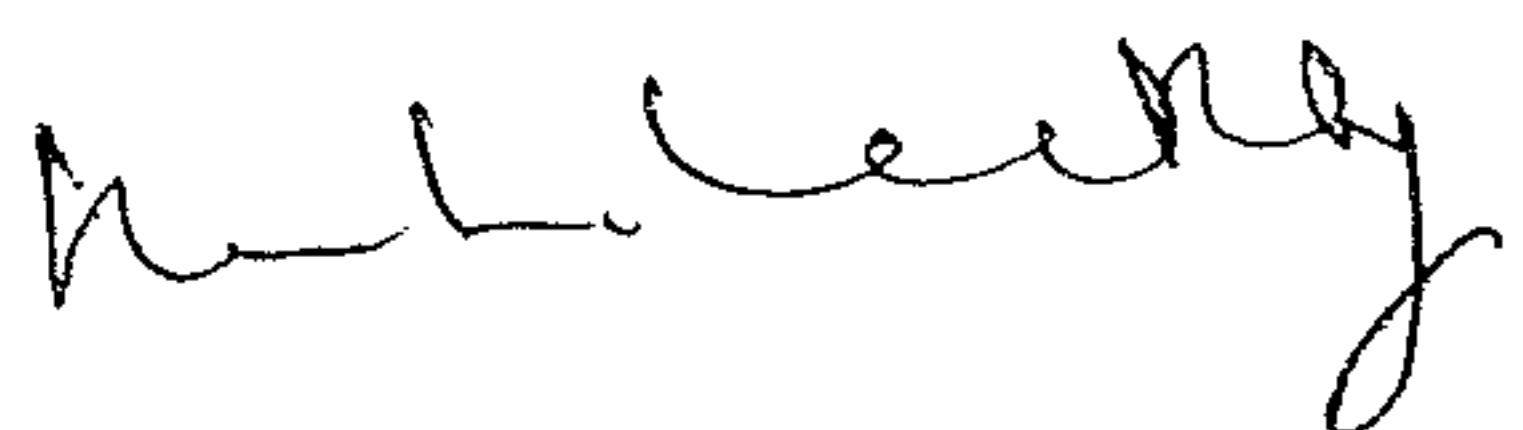
The Deposition of STAFF NURSE BRID SWIFT

of ERNE HOSPITAL, ENNISKILLEN who being sworn upon her oath, saith

My involvement in the care of Lucy Crawford (deceased) was as follows: 1945 hours – Report – told by S/N McDowell of Lucy Crawford's admission. 2020 hours approximately. I went to treatment room. Inside was S/N M Burns, Dr Malik, Mr and Mrs Crawford and Lucy. I introduced myself to the parents and S/N Burns left. Dr Malik found a small vein in Lucy's left foot and inserted a venflon. He obtained a blood sample and flushed the venflon with Hespal at this time the venflon tissueed it was then removed as it was not acceptable for Intravenous fluids access. I remained in the treatment room with Mrs Crawford and Lucy as Dr Malik went to phone Dr O'Donohoe and asked him to come to the ward. Lucy was given orange juice in a cup, approx 50mls. Lucy passed urine into a specimen bag and a sample was tested by myself which had protein and ketones. The rest of the urine was placed into a white top container and was left ready to be sent to the Lab. I done Lucy's temperature and it was still high so I gave her per rectum paracetamol 120mgs in the presence of her mother. Dr O'Donohoe came to the ward – he requested Elma cream be applied to both of Lucy's hands which I did. While he waited for the cream to work I made up a drink of dioralyte and gave Lucy 100mls which she drank. She asked for her dummy which her mother got her. Dr O'Donohoe then inserted a venflon into Lucy's hand and flushed it with Hespal. I connected the Intravenous line and I was instructed by Dr O'Donohoe to run the fluids at 100mls per hour until Lucy has passed

urine. In the presence of Dr O'Donohoe, Dr Malik, myself, Mrs Crawford and Lucy I connected the line to the drip counter and took Lucy and Mrs Crawford to cubicle 6 Medical side. Lucy vomited *** bile coloured fluid, she remained sleepy but her temperature settled. Mrs Crawford and Lucy's sister then came into the cubicle. This was approximately 2245 hours and after this point I had no direct contact with Lucy. After this time I attended to the other patients on the ward. At approximately 2.45 am I was attending another patient with S/N McManus when Sr Edmundson came onto the ward and came to speak to us in the sideroom. E/N McCaffrey came and told us Lucy had a large bowel motion, S/N McManus, Sr Edmundson and E/N McCaffrey went to assist Lucy and her mother. Lucy was then moved into a side room. At approximately 2.50 am I was still in sideroom when E/N McCaffrey called for help. S/N McManus and S/N Jones went to her assistance. The patient I was with settled so I came out to attend to the other patients. I seen the emergency trolley being pushed down the ward so I followed. As I reached the door of the sideroom Mrs Crawford asked me to phone her husband which I did. I let Mr Crawford and his daughter into the ward. Sr Edmundson also entered the ward and attended the Crawford family. Lucy's sister phoned and later Lucy's grandparents came to the ward. In the meantime I continued to attend the other patients. Lucy's sister felt faint and I took her to the day room and I gave her a glass of water and sat her down by the window. Her grandparents were in attendance. At this point I continued to attend the rest of the ward.

TAKEN before me this 18TH DAY OF FEBRUARY 2004

 Coroner for the District of Greater Belfast

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on _____ the _____ day
of _____ 20 _____, at inquest touching the death of _____
before me

Coroner for the District of _____

as follows to wit:—

The Deposition of STAFF NURSE DAVID SWIFT

of _____

who being sworn upon his

oath, saith

(Address)

Mr. Murragh : The admission assessment was done by Nurse McDowell and Dr. Malik. I was involved with Dr. Malik in the Treatment Room. He had difficulty obtaining a vein — he tried once unsuccessfully & I assumed he had made up to 3 attempts & he contacted Dr. O'Donohoe, I cannot recall how long he took to arrive, I was present when Dr. O'Donohoe inserted the needle — Dr. Malik was present then, Dr. O'Donohoe was in charge & he was responsible for recording fluid. Dr. Malik was responsible for recording it and I saw him with the fluid balance chart. I now know the chart does not refer to the rate or that it was to be run until urine was passed. At that time it was unusual for the rate not to be written down. I do not know why it was not recorded, I signed the chart prior to the IV fluid being put up, I was not present at the attempted resuscitation of Lucy.

Mr. Good : I did not speak to anyone in the ward about my personal life & I recall no such conversation with Dr. Malik, I cannot recall speaking to Mrs Crawford about paracetamol.

DHSSPS

P.T.O. 079
006-001-079

I did not say to her that the lab was closed -
if it is someone is on call, I did not leave
the room while Dr. Malik was attempting
access to the vein. The nursing staff were
very sadly affected by Lucy's death. Brian Swift

The Witness Concerned: Staff Nurse Brid Swift

Mr Murnaghan: The admission assessment was done by Nurse McDowell and Dr Malik. I was involved with Dr Malik in the treatment room. He had difficulty obtaining a vein – he tried once unsuccessfully. I assumed he had made up to three attempts as he contacted Dr O'Donohue, I cannot recall how long he took to arrive. I was present when Dr O'Donohue inserted the needle – Dr Malik was present then. Dr O'Donohue was in charge he was responsible for prescribing fluid. Dr Malik was responsible for recording it and I saw him with the fluid balance chart. I now know the chart does not refer to the rate or that it was to be run until urine was passed. At that time it was unusual for the rate not to be written down. I do not know why it was not recorded. I signed the chart prior to the IV fluid being put up. I was not present at the attempted resuscitation of Lucy.

Mr Good: I did not speak to anyone in the ward about my personal life and I recall no such conversation with Dr Malik. I cannot recall speaking to Mrs Crawford about paracetamol, I did not say to her that the lab was closed – if it is someone is on call. I did not leave the room whilst Dr Malik was attempting access to the vein. The nursing staff were very badly affected by Lucy's death.

CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on TUESDAY the 17TH DAY OF FEBRUARY 2004, at inquest touching the death of LUCY CRAWFORD, before me J L LECKEY Coroner for the District of GREATER BELFAST as follows to wit:-

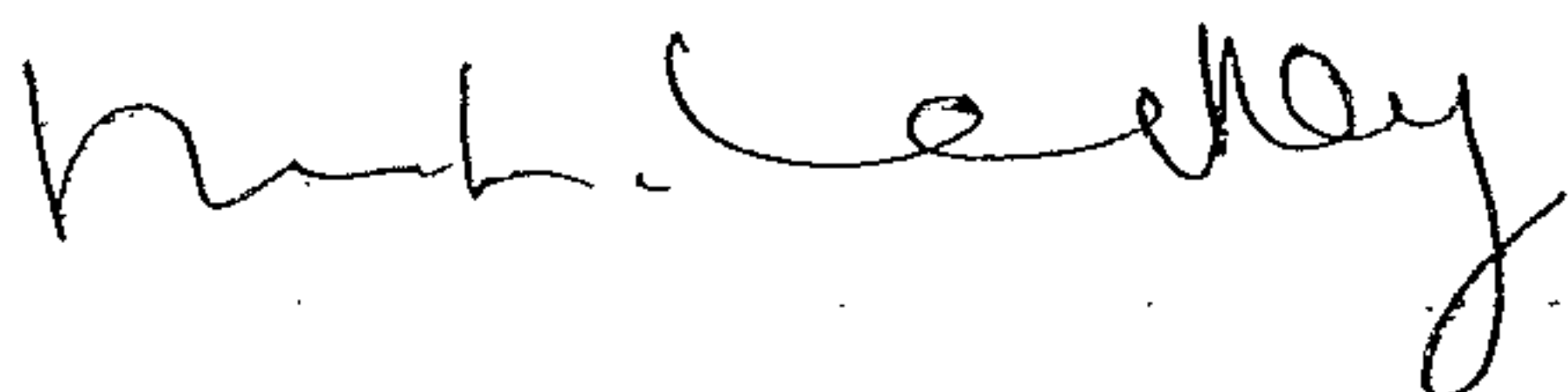
The Deposition of STAFF NURSE MRS SALLY MCMANUS

of ERNE HOSPITAL, ENNISKILLEN who being sworn upon her oath, saith

My involvement in the care of Lucy Crawford [L. C.] (deceased) was as follows: My dealings with Lucy began at 02.55 hours when I was called to see her by E/N T McCaffrey. Prior to this the history as documented by myself in the nursing kardex was as follows: Lucy was admitted with the day staff at 19.30 hours with a 36 hour history of vomiting, but no diarrhoea and had been becoming drowsy for the previous 12 hours. On admission Lucy was examined by Dr Malik (SHO), who was unable to successfully cannulate her. Dr O'Donohoe (Consultant on call) was called Dr O'Donohoe also had difficulties and small quantities of oral fluids were offered and tolerated, she appeared keen to drink. 50mls juice and 150mls dioralyte were taken slowly over the following 1 1/2 hours. At 22.30 hours cannulation was successful into the left hand. Intravenous fluids were commenced by S/N B Swift as per Doctors instructions at a rate of 100mls/hr. At 24.15 hours Lucy had a large vomit and Intravaneous fluids remained unchanged. At 02.30 hours I was informed by E/N McCaffrey that Lucy had had a large offensive episode of diarrhoea – Lucy was aprexial at this time, and awake in mum's arms while the bed was changed. At this time I was with another patient in a side room. I asked E/N McCaffrey to take routine stool specimens for Rotavirus, Culture and Sensitivity and Ecoli and to move Lucy to a side room to prevent cross infection as at this time she was being nursed on the open ward. At 02.55 hours E/N McCaffrey was called by Lucy's mum, she immediately alerted

me. On entering the room I found Lucy rigid in mum's arm. I took Lucy from mum and laid her on the bed, she had no loss of colour, but was rigid with lip smacking and twitching of eyelids. Oxygen therapy was commenced at 5 litres/minute and observations recorded. Dr Malik was bleeped to come urgently to the ward, suction was brought into the room though not required at this time. Before the SHO arrived Lucy appeared to come out of the episode, limbs loosened and eyes opened but then became rigid again. SHO arrived, history given and full examination done. 2.5mg per rectum diazepam was given but within 1 minute of being given Lucy had a large watery stool. Intravenous fluids were changed to 0.9% Sodium Chloride as Blood Sugar Monitoring recorded as 13.4 mmols. At 03.20 hours am Lucy was noted to have decreased respiratory effort, an airway was inserted and bagging commenced via face mask. Dr O'Donohoe now present, repeat Urea and Electrolytes ordered, also chest and abdominal x-rays. Anaesthetist requested to attend. I was not involved with the resuscitation of Lucy. On arrival of the Anaesthetist this role was carried out by S/N T Jones as documented by herself within the nursing kardex.

TAKEN before me this 18TH DAY OF FEBRUARY 2004

 Coroner for the District of Greater Belfast

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on _____ the _____ day
of _____ 20 _____, at inquest touching the death of _____
_____, before me

Coroner for the District of _____

as follows to wit:—

The Deposition of S/N SALLY McMANUS,

of _____

(Address)

who being sworn upon h

oath, saith

Mr. Munnaghan: 2.55 a.m. was the first time I
was involved with the care of Lucy. The
Radox was completed on the basis of what
was told by a number of persons including
S/N Swift. Fluid management is the
responsibility of the doctors. I was not present
during resuscitation.

Mr. Good: On the ward I would see
resuscitation attempts. The resusc kit has
trays 2 of each item. If they are not there
they are obtained from the Treatment Room,
and drugs
Some equipment may have to be brought in to the
side-room. It may give an impression of
panic. S. McManus.

S

The witness concerned: **Staff Nurse Sally McManus**

Mr Murnaghan: 2.55 am was the first time I was involved with the care of Lucy. The kardex was completed on the basis of what I was told by a number of persons including Staff Nurse Swift. Fluid management is the responsibility of the doctors. I was not present during resuscitation.

Mr Good: On the ward I would see resuscitation attempts. The resuscitation trolley keeps 2 of each item. If they are not there they are obtained from the treatment room. Some equipment and drugs may have to be brought in to the side room. It may give an impression of panic.

CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on TUESDAY the 17TH DAY OF FEBRUARY 2004, at inquest touching the death of LUCY CRAWFORD, before me J L LECKEY Coroner for the District of GREATER BELFAST as follows to wit:-

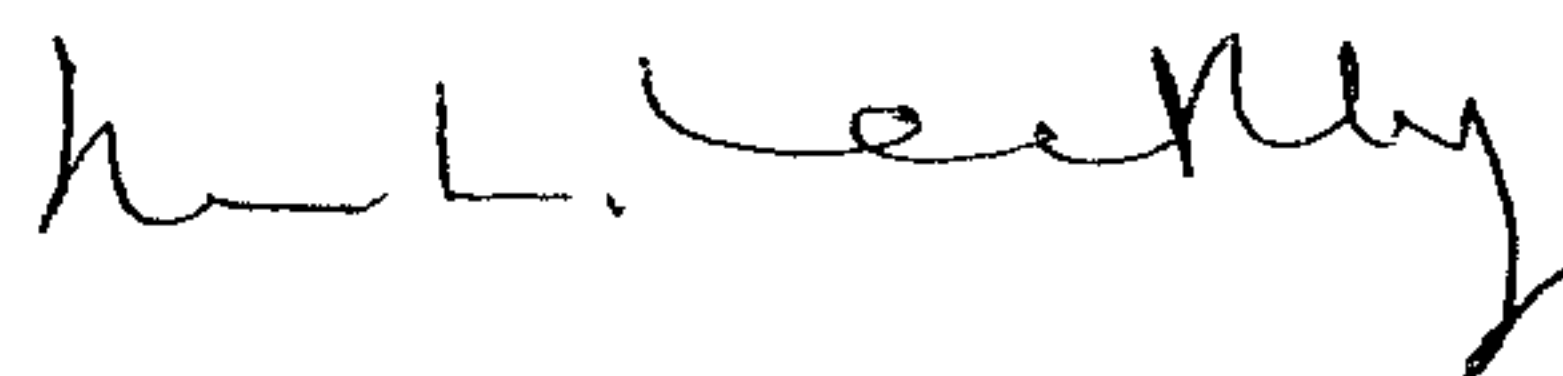
The Deposition of STAFF NURSE MRS THECLA JONES

of ERNE HOSPITAL, ENNISKILLEN who being sworn upon her oath, saith

My involvement in the care of Lucy Crawford (deceased) was as follows:
I first saw Lucy about 2300 hours when she was brought to her cot from the treatment room. Her mother was with her. Intravenous fluids were in progress. At midnight Lucy vomited and I gave assistance. Dr Malik who was on the ward was informed. At 0100 hours, 13 April 2000 I spoke to Mrs Crawford as I heard Lucy moving about the cot, she had turned herself to an all four sleeping position. On returning from my break at around 0300 hours I was told that Lucy had severe diarrhoea and had suffered a 'fit'. Rectal Diazepam had been given but Lucy had further diarrhoea following its administration. I went into the side room, which Lucy had been moved into, Nurse McManus and Dr Malik were in attendance; oxygen was being administered. Mrs Crawford was also present. An emergency call was put through for Dr O'Donohoe and the emergency trolley was brought to the room door. As the Blood Sugar Monitoring readings were elevated the intravenous fluids were changed from .18% Saline/4%Dextrose (No 18 Sol) to 500 mls of Normal Saline and left to run fairly freely. Monitoring equipment was sent for and I listened with a stethoscope to Lucy's heart rate for 30 seconds; it was a good strong steady beat of 140 beats per minute. As Lucy remained unresponsive she was turned from her Left to Right side for easier access. On turning her around her mouth and lips became cyanosed. Suction was given, an airway inserted and bagging commenced by Dr Malik.

Monitoring equipment was connected up to record heart rate, Blood Pressure at 5 minute intervals and oxygen saturation levels. At approximately 0330 hours Dr O'Donohoe was unsuccessful ^{at attempting to intubate Lucy.} Dr Auterson who had been contacted, arrived and successfully intubated Lucy at approximately 0400 hours. Dr Auterson requested Fliemazenil (Anaxate) which Nurse MacNeill brought from Ward 5 Intensive Care Unit, and it was given intravenously. Throughout resuscitation ongoing discussion took place regarding Lucy's condition. Abdominal X-ray showed a query of abdominal distension although diarrhoea still persisted. I checked the fluid balance chart and confirmed that approximately 400mls of .18%Saline/4%Dextrose (No 18 Sol) plus the ongoing 500 mls of Normal Saline had been given intravenous and that Lucy had vomited earlier as well as having diarrhoea. Catheterisation was ordered and I carried out this procedure, a small amount of residual urine only was obtained. As assisted ventilation was necessary arrangements were made for Lucy's transfer to Ward 5 Intensive Care Unit and then on to Belfast. Her parents were informed and spoken to by Dr O'Donohoe and Dr Auterson. Time approximately 0445 hours. I accompanied Lucy with Medical staff to Ward 5 and stayed to give assistance. At approximately 0645 hours Lucy was transferred to Belfast by ambulance accompanied by Dr O'Donohoe and Nurse MacNeill.

TAKEN before me this 18TH DAY OF FEBRUARY 2004

 Coroner for the District of Greater Belfast

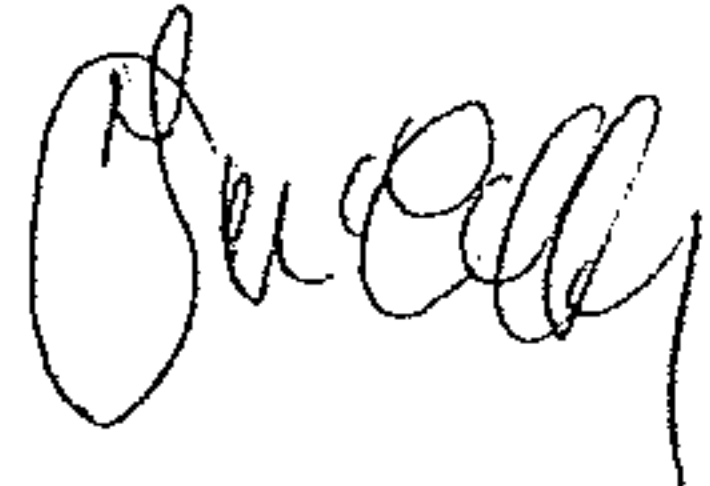
CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on TUESDAY the 17TH DAY OF FEBRUARY 2004, at inquest touching the death of LUCY CRAWFORD, before me J L LECKEY Coroner for the District of GREATER BELFAST as follows to wit:-

The Deposition of ENROLLED NURSE TERESA MCCAFFREY of ERNE HOSPITAL, ENNISKILLEN who being sworn upon her oath, saith

My involvement in the care of Lucy Crawford (deceased) was as follows: I met Lucy and her parents following our handover from the day staff. I was giving out the evening suppers at 20.30 hours. I offered Mr and Mrs Crawford a cup of tea and a drink of juice for Lucy. I went on with my trolley to give supper to the rest of the children on the ward. I really had very little to do with Lucy until Mrs Crawford 'buzzed' in cubicle 6 at 02.20 hours. Lucy had a dirty nappy, some had got onto the sheets, so mum changed the nappy and I changed the sheets. The nappy was very foul smelling, the large nappy was very runny and very yellow in colour, it was very offensive. At that Sr Edmundson arrived into Cubicle 6, she commented on the smell, then she spoke to Mrs Crawford. I put the nappy into the sluice room, went and reported the nappy to S/N McManus and she advised me to move Lucy and her mother to a sideward. 02.30 hours I returned to Cubicle 6 and told Mrs Crawford that Lucy would be better off in a sideroom when she had diarrhoea. Mrs Crawford agreed and herself and I moved the cot and Lucy and Intravenous fluids up the corridor to sideward No 10. I moved the bed in the room over, so that I could put the cot into the room. I went back down the ward and brought their belongings. Mum settled Lucy down, then got into bed herself. I assured Mum that we would be popping in and out to check on Lucy through the night, but if she needed us she could 'buzz' and I showed her how to push the buzzer. 02.40 hours I went to the Treatment room, got blue top bottles,

went to the sluice room and scooped faeces from the nappy, then returned to the office to write out my forms. 02.55 hours The buzzer sounded in sideward 10. I went down and met Mrs Crawford in the doorway. "Nurse help Lucy, help Lucy" was her words. Lucy appeared pale and rigid. I took the child and laid her in her cot, I stepped to the doorway and called loudly for S/N McManus, she came immediately followed a couple of minutes later by S/N T Jones. I passed the Oxygen mask to S/N McManus and turned on the Oxygen. I went out of the room and bleeped Dr Malik (SHO) via switchboard, he came promptly. I went back to the room, S/N McManus asked me to go and get rectal Diazepam, this I did. On returning to the room, I helped S/N Jones to remove the bed from the room. I then pushed down the emergency trolley. I reassured the mother. Then Dr O'Donohoe (Consultant on Call) arrived followed approximately 20 minutes later by Dr Auterson. I was sent to the Laboratory with blood. When I returned I was asked to go to Ward 5 for a drug. S/N MacNeill returned to Childrens ward with the drug. When I returned I stayed with the parents outside the corridor outside the room. I also stayed in close proximity to the room to be able to get any further equipment required. 04.40 hours Lucy was moved to Intensive Care Unit. S/N Jones and Doctors accompanied her.



TAKEN before me this 18TH DAY OF FEBRUARY 2004



Coroner for the District of Greater Belfast

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on the day
of 20, at inquest touching the death of
, before me

Coroner for the District of

as follows to wit:—

The Deposition of S/N THECLA JONES

of

(Address)

who being sworn upon her oath, saith

Mr. Munnaghan: When Lucy vomited at midnight Dr Malik gave me no further instructions. The decision to change fluid was made by Dr Malik with an instruction for fairly free-running. During resuscitation it can appear like organized chaos.

Mr Good: Everyone would know their role & how to do it. Meda Jones

The witness concerned: Staff Nurse Thecla Jones

Mr Murnaghan: When Lucy vomited at midnight Dr Malik gave me no further instruction. The decision to change fluid was made by Dr Malik with an instruction for fairly free running. During resuscitation it can appear like organised chaos.

Mr Good: Everyone would know their role and how to do it.

CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on TUESDAY the 17 FEBRUARY 2004,
at inquest touching the death of LUCY CRAWFORD, before me J L
LECKEY Coroner for the District of GREATER BELFAST
as follows to wit:-

The Deposition of SIOBHAN MacNEILL
of who being sworn upon her oath, saith

At approximately 4.00 am on 13 April 2000 a Staff Nurse from the Children's ward made a request for the drug Annexate, which I brought, prepared and checked with Dr Auterson. I then assisted Staff Nurse T Jones to insert a urinary cathetar. I attended to Lucy's personal hygiene prior to catheterisation. At approximately 4.20am I returned to ward 5 to prepare for Lucy's transfer to Intensive Care Unit, Erne. Lucy arrived to ward 5 at 4.40am with Dr Auterson, Dr O'Donohoe and Staff Nurse T Jones. Dr Auterson commenced Lucy on the Puritain Bennett 7200A Ventilator. I commenced ECG monitoring, applied Blood Pressure Cuff and recorded same. I checked her level of consciousness and recorded her Glasgow Coma Scale. I also checked pupil size and reaction, and applied oxygen saturation probe to Lucy's toe. I monitored and recorded these vital signs during Lucy's stay in Intensive Care, Erne. Dr O'Donohoe prescribed Mannitol 20% (25mls) over 30 minutes. Same was infused same via a syringe pump. Intravenous fluid of normal saline 0.9% was infused via a Buritol Infusor at 30mls/hr. Dr Auterson re-intubated Lucy with a Naso-tracheal tube, and I assisted him with intubation and with insertion of an arterial line, and Nason-gastric tube. Lucy was transferred to the ambulance stretcher in preparation for transfer to the Royal Belfast Hospital for Sick Children using the Children's Ward transport monitor to record ECG, blood pressure and oxygen saturation levels. Ventilation was continued manually by Dr O'Donohoe.

Dr Auterson checked Lucy's condition in the ambulance. Dr O'Donohoe and myself accompanied Lucy and we left the Erne Hospital at 6.30am. During the journey manual ventilation was continued alternating with Dr O'Donohoe and myself. I observed and recorded Lucy's ECG rhythm, blood pressure and oxygen saturation levels throughout the journey. These were recorded on the back of the transfer sheet. During the journey Lucy became hypotensive. Dr O'Donohoe instructed me to infuse Dopamine via syringe pump at 1ml-1.5ml/hr. We arrived at Royal Belfast Hospital for Sick Children at 8.10am. Lucy was moved from the ambulance to the Paediatric Intensive Care Unit where I gave the Staff Nurse a report on Lucy's condition.

Seibha Ma Neil

TAKEN before me this 18 FEBRUARY 2004

M. L. Leahy

Coroner for the District of Greater Belfast

Mr. Mumaghan : Only the transfer sheet and a doctor's letter accompanied Lucy in the ambulance.

M. L. Leahy

CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on TUESDAY the 17TH day of FEBRUARY 2004, at inquest touching the death of LUCY CRAWFORD, before me MR J L LECKEY Coroner for the District of GREATER BELFAST as follows to wit:-

The Deposition of DR DONNCHA HANRAHAN of ROYAL BELFAST HOSPITAL FOR SICK CHILDREN, GROSVENOR ROAD, BELFAST, BT12 6BA who being sworn upon his oath, saith

I, Dr Donncha Hanrahan, am a registered medical practitioner and a Consultant in Paediatric Neurology in the Royal ^{BELFAST} ~~Victoria~~ Hospital for Sick Children. I qualified in 1985 and was appointed to my present post in 1998. I achieved a Diploma in Child Health in 1988 and became a member of the Royal College of Physicians of Ireland in 1990. I was awarded the M.D. Degree from University College Dublin in 1997 and am a fellow of the Royal College of Paediatrics and Child Health. Lucy Crawford, was transferred from Erne Hospital, Enniskillen to the Paediatric Intensive Care Unit in the Royal Belfast Hospital for Sick Children on 13th April 2000.

Lucy Crawford arrived in Paediatric Intensive Care at approximately 8.30 a.m. on 13th April. I first reviewed her approximately two hours later at 10.30 a.m. At my initial assessment, I did not have access to her Enniskillen notes. An entry in her notes relating to the ward round of that morning by Dr Crean, stated that he was awaiting faxes of her notes and that she was to be reviewed by a Neurologist that morning. It was shortly after that that I saw her and it was subsequent to my reviewing her that Dr Crean's typed-up entry was inserted into her notes. My impression, when I first encountered her, was that there was no sign of brain – stem function

and I believe, therefore, that she was brain – dead, with an irretreviable situation when I first examined her.

The story which I first got at that stage was that, on 11th April ie two days before transfer, Lucy was vomiting. She was somewhat better that evening and the following day, was drinking some boiled water but vomited this. She was listless and lethargic. At 2.00 p.m. she was give Paracetamol for pyrexia but her level consciousness was somewhat decreased. Her parents rang the ~~Contractors~~ and she was seen by an out-of hours doctor, who referred her to the Erne Hospital, with her arriving there at approximately 19.30 hours. According to Dr O'Donohoe's letter at this stage, IV placement was achieved three hours later. Her initial sodium was 137 and her potassium was 4.1. She was given 18. (0.18% NaCL and 4% dextrose) according to her fluid balance chart, she was given 100mls an hour of this once IV placement was achieved.

At 11pm, she was noted to be staring somewhat with her eyes quite glazed. At approximately 3.00 a.m., she was restless with some abnormal breathing and then she went quite rigid. At that stage, she had some offensive diarrhoea and it was then noted that her pupils were fixed and dilated. She was intubated by an anaesthetist and approximately at that stage, her sodium was found to have dropped to 127. She was given what appears to have been a large bolus dose (500mls) of normal saline (0.9%).

Lucy had been previously well part from some bronchiolitis. She had been born by Caesarean section but was well. Her vaccinations were up todate and she was taking no regular medication. She had one older sister aged sixteen and one older brother aged thirteen.

When I examined her at 10.30 a.m., she was cold (31 degrees) and was pale. She was completely unresponsive. Her pupils were fixed and unresponsive. I could elicit no corneal gag or doll's eye reflex. Her fundi appeared normal with no haemorrhages or papilloedema. Her reflexes were present but dismissed.

My overall impression, assuming that her paralysis had worn off from intubation and that she had been given no sedation, was that she was showing no signs now of brain-stem function and that she was brain dead. I recommended a CT scan and an E.E.G.

Not having access to her fluid chart at that stage, my differential diagnosis included infection, possibly from herpes, haemorrhagic shock encephalopathy, metabolic disease, including urea cycle defect and cerebral oedema from other cause. Various investigations were all normal and subsequent events transpired to indicate that cerebral oedema, probably related to hyponatraemia, in turn related to a gastroenteritis, was the cause of death.

Her E.E.G. was isoelectric, showing no discernable cerebral function. Her CT Scan showed obliteration of the basal cisterns, suggesting that she had coned, which means that due to raised intracranial pressure, her brain was forced down through the foramen magnum, causing pressure on her brain - stem and death.

I reviewed Lucy again that evening, at 17.45, and I felt that her prognosis was hopeless. I discussed it with her parents, who were agreeable to her not being actively resuscitated in the event of acute ^{ex} deterioration. I mentioned at that stage that if she succumbed that a post mortem would be desirable and that the Coroner would have to be informed.

In the company of Dr Chisakuta I performed two sets of brain - stem tests neither of which showed any sign of life. After discussion with the transplant team, Lucy was electively extubated at 13.00 on 14th ~~August~~ ^{APRIL} 2000 and was declared dead at 13.15.

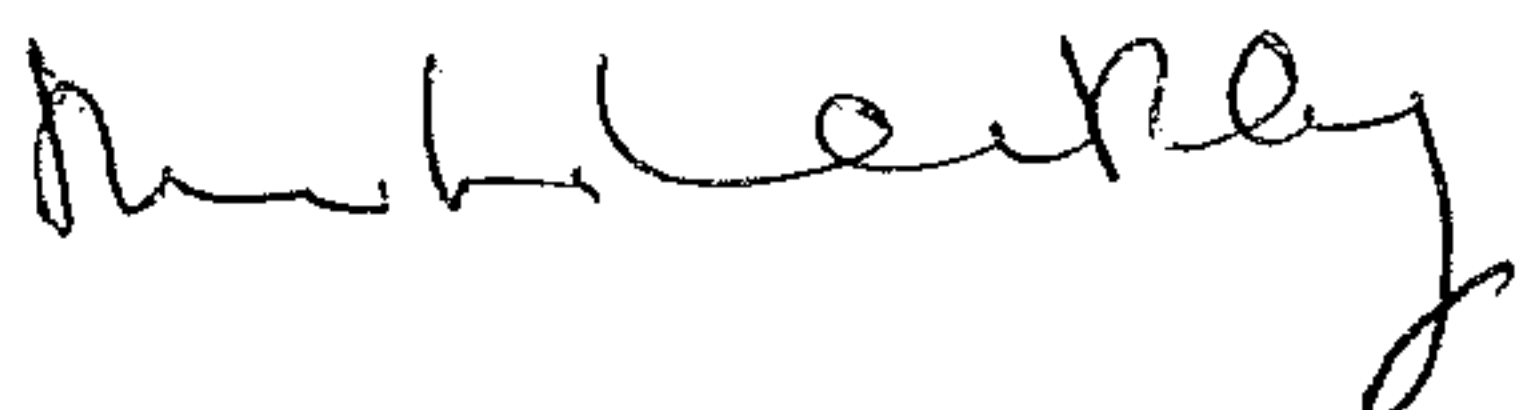
Earlier that morning Dr Stewart (who was then my registrar) made a note that I contacted Dr Curtis on behalf of the Coroner's and discussed the

case. The Coroner's Office advised that a Coroner's post – mortem was not required but that a hospital post – mortem would be useful to establish the cause of death and rule out other diagnoses. Her parents subsequently consented to post mortem.

Subsequently, Lucy was shown to have been suffering from rotavirus. Her post mortem showed cerebral oedema and bronchopneumonia. The brain was swollen and showed some signs of early necrosis. The bronchopneumonia was established and was felt to have been present for twenty four hours at least and could have happened, therefore, at Lucy's acute worsening at approximately 3 a.m. on 13th April.

Having discussed with the Coroner's Office, I subsequently interviewed her parents on 9th June and I encouraged them to re-attend Dr O'Donohue to clarify events in the Erne Hospital. I agree that the cause of death should be
(a) Cerebral Oedema (b) Acute Bilateral Hyponatraemia (c) Excess Dilute Fluid
II Gastroenteritis.

TAKEN before me this 17TH day of FEBRUARY 2004



Coroner for the District of Greater Belfast

DHSSPS

006-001-099

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on the day
of 20, at inquest touching the death of
, before me

Coroner for the District of

as follows to wit:—

The Deposition of DR. DONNCHA HARRAHAN

of

who being sworn upon his

oath, saith

(Address)

~~Mr. Fee~~ Mr. Fee: I agree with the views expressed
that the fluid regime was incorrect. A more
concentrated solution should have been used.
Mr. Good: I am not an expert on fluid
management. I accept fluid documentation
may have arrived in RBHSC but I did
not see it until 10.30 a.m. Doncha Harrahan

The witness concerned: **Dr Donncha Hanrahan**

I agree that the cause of death should be 1(a) Cerebral Oedema (b) Acute Dilutional Hyponatraemia (c) Excess Dilute Fluid II Gastroenteritis.

Mr Fee: I agree with the views expressed that the fluid regime was incorrect. A more concentrated solution should have been used.

Mr Good: I am not an expert on fluid management. I accept fluid documentation may have arrived in RBHSC but I did not see it until 10.00 am.

CORONERS ACT (NORTHERN IRELAND) 1959

Deposition of Witness taken on THURSDAY the 19TH day of FEBRUARY 2004, at inquest touching the death of LUCY CRAWFORD, before me MR J L LECKEY Coroner for the District of GREATER BELFAST as follows to wit:-

The Deposition of DR JOHN G JENKINS MD FRCP FRCPCH - CONSULTANT PAEDIATRICIAN of ANTRIM AREA HOSPITAL, 45 BUSH ROAD, ANTRIM who being sworn upon his oath, saith

I am a Senior Lecturer in Child Health and a Consultant Paediatrician. Initially I had been asked to prepare a report on the death of Lucy by the Directorate of Legal Services, Central Services Agency and this report was based on material made available including hospital notes relating to admission of the child to Erne Hospital in November 1999 and April 2000. The first admission was for bronchiolitis and is not directly relevant to the problems which occurred during the subsequent admission in April 2000. At that time Lucy was admitted to hospital with a history of fever and vomiting for 36 hours associated with drowsiness for 12 hours. There was no history of cough and her chest was clear on examination. The history and clinical findings had been thought by the GP to suggest urinary tract infection but it was felt on admission that this was more likely to be a viral illness, *i.e. gastroenteritis*. Initial blood tests were performed and Dr Malik attempted to commence IV fluids but was unable to do so and so called Dr O'Donohoe (the Consultant Paediatrician). IV fluids were then commenced. The nursing notes record observations at 19.30, 22.30 and 23.30 during which time the high temperature gradually came down to 37.4.

There is then a gap in the observation sheet with no apparent entry until an episode of sudden collapse which occurred around 3.00 a.m. It appears that mother called nursing staff as Lucy had passed diarrhoea and then became

rigid. Dr Malik was called and felt that this could be a febrile convulsion so administered Diazepam. He discussed the case with Dr O'Donohoe who then came directly to hospital arriving at 3.20 a.m. At around this time Lucy's condition further deteriorated as she stopped breathing and required respiratory support. The on-call Anaesthetist was called at 3.40 a.m. and Dr Auterson arrived shortly after 3.50 a.m. and assisted with the resuscitation including intubation and transfer to the Intensive Care Unit prior to stabilisation and transfer to the Paediatric Intensive Care Unit in the Royal Belfast Hospital for Sick Children later on the same morning. The Doctors involved seem clear that there was no episode of cardiac arrest or circulatory instability during this period but it was noted that the pupils became fixed and dilated and did not respond to ventilation ^{or} ~~of~~ the administration of Mannitol.

Subsequent tests in Belfast revealed evidence of brain stem death and post mortem examination was performed. This showed bronchopneumonia and cerebral oedema with evidence of herniation of the brain. The Pathologist is unable to comment as to whether the bronchopneumonia had been present from admission to Erne Hospital or had occurred in association with the collapse and resuscitation. Further specimens have shown rotavirus infection suggesting that the initial admission was likely to be due to rotavirus gastroenteritis. Urine cultures showed no significant growth

Comment

This child's admission to Erne Hospital was very typical of gastroenteritis in this age group. This is often associated with high temperature and vomiting with or without diarrhoea and young children ^{can quickly} ~~came~~ become very unwell. The standard treatment is to administer fluids either orally or (if there is significant dehydration or vomiting) by the intravenous route. The solution used ^{is} ~~is~~ one which is commonly used in paediatric practice to provide **maintenance** fluids in these circumstances as it replaces small amounts of electrolytes but also gives Dextrose which is required by

young children who are unable to take calories orally during the acute phase of the illness. Initial physical findings were suggestive of poor peripheral circulation with delayed capillary refill time >2 seconds. The GP noted that the mucosae were moist but there is little specific detail in the admission note regarding evidence of dehydration. However the urea was 9.9 which is slightly elevated suggesting a mild degree of dehydration but with normal electrolytes at that time. This would again be very typical of the condition and would not normally indicate anything other than appropriate fluid replacement with careful monitoring and nursing observation. However, in this situation the intravenous fluids for **replacement** should contain a higher content of sodium (eg "normal saline" – 0.9%NaCL – sodium chloride).

In these circumstances it is always very difficult to understand an episode of sudden collapse. Sudden onset of convulsions is most commonly due to high temperature in young children and this was considered. However, the features were not typical and the temperature had in fact improved since admission. It is unclear as to what alternative diagnoses were considered at this time but the blood test for electrolytes was appropriately repeated immediately. This showed a significant fall in sodium from 137 to 127 and in potassium from 4.1 to 2.5, together with an increase in glucose from 4.5 to 10.9. These ^{values} ~~questions~~ do raise the question as to the fluid management in the period from insertion of the IV line at 23.00 to the collapse at 3.00 a.m. Unfortunately there appears to have been confusion between the staff involved as to the fluid regime ordered by the Consultant. In addition it is difficult to interpret the records made by nurses on the fluid balance chart and no totals have been calculated for this period. It will be most important to determine from the staff involved **exactly how much of each type of fluid** was given at each stage throughout the time period, and following the change of fluids to normal saline through until the child arrived in the Paediatric Intensive Care Unit in Belfast.

Other aspects of this tragic case demonstrate a rapid and effective response by the medical staff concerned. In particular both the Consultant

Paediatrician and Consultant Anaesthetist appear to have been available within a very short time of having been called and have done their best in the difficult circumstances involved in caring for a child of this age in an adult intensive care setting for stabilisation and transfer in the absence of a Paediatric transfer service in Northern Ireland.

Over recent years concerns have begun to be expressed regarding the use of 0.18% saline in Dextrose as a standard solution for intravenous use in young children and a number of cases of symptomatic hyponatraemia have been identified, some resulting in death or cerebral damage. It has been suggested that a more appropriate solution would contain a higher level of sodium and this has recently been the subject of discussions involving the Department of Health, Social Services and Public Safety and production of guidelines. However it must be emphasised that this is a very recent development and that many Paediatric Units are continuing to use the solution which was initially given in this case. Although the sodium level of 127 is not in itself usually associated with severe problems, it is likely to be the rate at which the sodium falls rather than the absolute level which can cause problems in this setting.

While no definite conclusions can be drawn regarding the cause of this child's deterioration and subsequent death, there is certainly a suggestion that this was associated with a rapid fall in sodium associated with intravenous fluid administration and causing hyponatraemia and cerebral oedema. It would have been advantageous ^{to me} if there had been available documentation regarding the fluid type and rate prescribed, together with clear records as to the exact volumes of each fluid, which were in fact received by the child throughout the time period concerned. Unfortunately, there appears to have been confusion between the staff involved with inadequate documentation and record keeping.

In this respect, unless this can be clarified in a satisfactory manner, it is my opinion that management fell below the standard which would be accepted by a responsible body of medical opinion as reasonable practice at the relevant time. I agree that the cause of death should be I(a) Cerebral Oedema (b) Acute Dilutional Hyponatraemia (c) Excess Dilute Fluid (i) Sepsis.

TAKEN before me this 19TH day of FEBRUARY 2004



Coroner for the District of Greater Belfast

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on the day
of 20, at inquest touching the death of
, before me

Coroner for the District of

as follows to wit:—

The Deposition of DR. JOHN JENKINS

of

(Address)

who being sworn upon his

oath, saith

Mr. Free: I cannot say if the interval between admission to the successful insertion of the IV line was too long. The doctor should make an assessment of the level of dehydration. I saw nothing in the notes to show that this had been done. It is important that a formal assessment of the degree of dehydration is made. That does not appear to have happened. A formula should be devised by the doctor as to the fluid regime. The formula should be written down though not always the actual calculation. I do not believe that is always necessary. I agree it is mandatory to write a proper fluid prescription and designated chart stating what fluid is to be given and at what rate. I agree that the care Lucy received was sub-standard. 18 solution is completely wrong to make up deficits. That had not been well clarified in the paediatric literature at the time of the death of Lucy. There was a poor understanding of this area in the treatment of children at that time. I prepared my report on 7th March 2002. At the time of Lucy's death 18 solution was commonly used

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P.T.O.
006-001-105

for both maintenance & depletion in some circumstances. At 2000 there were different views expressed in relevant texts. For Lucy I would have given a solution of a litre of 100 mEq followed by 18 solution. There is no other explanation for what happened to Lucy than excessive dilute fluid. It was an extremely grave state of affairs that the rate of infusion was not written down. The doctor who decides on the fluid regime is responsible for writing up the prescription - fluid to be used & the rate of infusion. Normally nurses record fluid details on a separate sheet. In this case their record is difficult to interpret. I agree that the rate of fall of the sodium level is as important or more important ^{than} the sodium level. I agree that the rapid fall in sodium was the cause of the cerebral oedema in Lucy. I base that on the other investigations referred to by Dr. Harrigan.

Mr. Good : I was a member of the Working Party set up by the Dept. There was a literature search on a world-wide basis. The literature did not provide clear guidance. There was a range of approaches to a child with mild dehydration. The aim of the Working Party was to provide clarity - guidelines to be applied in different cases. One absolute definition was not possible, but found 18 solution was commonly used & there was ignorance of all its implications. I agree that the level of dehydration for Lucy was 5-7.5%. I would

TAKEN before me this 19th day of February 2004.

John. Carley

Coroner for the District of

Greater
Holt

006-001-106

DHSSPS

CORONERS ACT (Northern Ireland), 1959

Deposition of Witness taken on the day
of 20, at inquest touching the death of
, before me

Coroner for the District of

as follows to wit:—

The Deposition of DR. JOHN FENKINS

of

(Address)

who being sworn upon his oath, saith

have assessed Lucy for circulatory compromise
— an initial bolus of 100 ml of solution
followed very possibly by 18 solution. If there
were significant ongoing losses extra amounts
of solution. I am not surprised that 18
solution was used at the time. The regime of
Dr Evans at Para 41 reflects his personal
approach. I believe it is a different approach
to the problem — a simpler solution. This is an
averaging approach. On the available information
I have no criticism of the resuscitation
procedure. Any further losses would have
required careful assessment. John Fenkins

The witness concerned: **Dr John G Jenkins MD FRCP FRCPSH**

I agree that the cause of death should be 1(a) Cerebral Oedema (b) Acute Dilutional Hyponatraemia (c) Excess Dilute Fluid II Gastroenteritis.

Mr Fee: I cannot say if the interval between admission and the successful insertion of the IV line was too long. The doctor should make an assessment of the level of dehydration. I saw nothing in the notes to show that this had been done. It is important that a formal assessment of the degree of dehydration is made. That does not appear to have happened. A formula should be devised by the doctor as to the fluid required. The formula should be written down though not always the actual calculation. I do not believe that is always necessary. I agree it is mandatory to write a proper fluid prescription on a designated chart stating what fluid is to be given and at what rate. I agree that the care Lucy received was sub standard. No 18 solution is completely wrong to make up deficits. That had not been well clarified in the paediatric literature at the time of the death of Lucy. There was a poor understanding of this area in the treatment of children at that time. I prepared my report on 7th March 2002. At the time of Lucy's death No 18 solution was commonly used for both maintenance and deficits in some circumstances. At 2000 there were different views expressed in relevant texts. For Lucy I would have given 9 solution as a bolus of 100 mls followed by 18 solution. There is no other explanation for what happened to Lucy than excessive dilute fluid. It was an extremely grave state of affairs that the rate of infusion was not written down. The doctor who decided on the fluid regime is responsible for writing up the prescription - fluid to be used and the rate of infusion. Normally nurses record fluid details on a separate sheet. In this case their record is difficult to interpret. I agree that the rate of fall of the sodium level is as important or more important than the sodium level. I agree that the rapid fall in sodium is the cause of the Cerebral Oedema in Lucy. I base that on the other investigations referred to by Dr Hanrahan.

Mr Good: I was a member of the Working Party set up by the Department. There was a literature search on a worldwide basis. The literature did not provide clear guidance. There were a range of approaches to a child with mild dehydration. The aim of the Working Party was to provide clarity - guidelines to be applied in different cases. One absolute definition was not possible. We found No 18 solution was commonly used and there was ignorance of all its implications. I agree that the band of dehydration for Lucy was 5-7.5%. I would have assessed Lucy for circulatory compromise - an initial bolus of 100 ml No 9 solution followed very possibly by No 18 solution. If there were significant ongoing losses extra amounts of No 9 solution. I am not surprised that No 18 solution was used at the Erne. The regime of Dr Evans at paragraph 41 reflects his personal approach. I believe it is a different approach to the problem - a simpler solution, his is an

averaging approach. On the available information I leave no criticism of the resuscitation procedures. Any further losses would have required careful assessment.



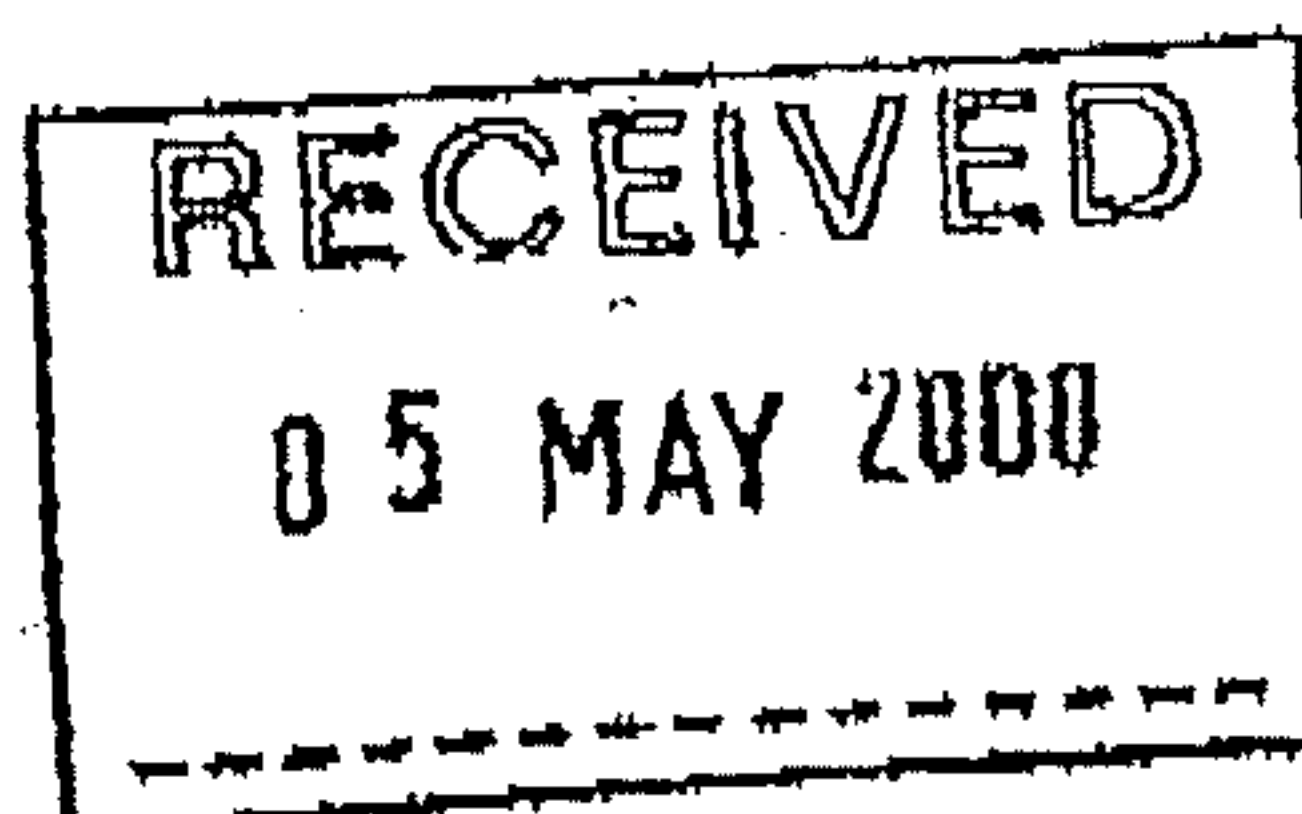
Received pursuant to
Rule 17

ERNE HOSPITAL
ENNISKILLEN, CO. FERMANAGH. BT74 6AY. TELEPHONE [REDACTED] FACSIMILE [REDACTED]

5 May 2000

CONFIDENTIAL

Mrs E Miller
Clinical Services Manager
Erne Hospital
ENNISKILLEN
BT74 6AY



Dear Mrs Miller

Re: Lucy Crawford DOB: 05/11/98 ERN: 123000

I saw Lucy at the request of her General Practitioner on 12 April 2000 at 1930 with a 2 day history of fever, vomiting and passing of smelly urine. The General Practitioner's impression was that Lucy was suffering from query UTI and needed intravenous fluids.

I took a detailed history, examined the patient and made the provisional diagnosis of viral illness. I admitted her for investigations and administration of intravenous fluids. I did manage to take bloods for FBC and U&E but could not insert intravenous cannula so I called Dr O'Donohoe around 2100 for his advice regarding management of the patient. When Dr O'Donohoe arrived I gave him my clinical findings regarding this patient. While he was managing the patient I was called away to see another emergency admission. I saw 3 patients at the request of General Practitioners and finished my last admission at 0130.

I received a bleep from Children's ward at 0258 (13/4/00) saying that Lucy had become unwell. I went straight away to the ward and was informed by a nurse that Lucy was having a fit. When I examined her she was having a tonic fit with twitching of the fingers on both her hands. She was afebrile and breathing spontaneously, peripheral pulses were present and chest was clear. I told the nurse to give 2.5 mgs of Diazepam rectally. In the meantime Dr O'Donohoe was contacted by one of the Nursing Staff and I went to the nurses' station to talk to him on the telephone. I briefed him about Lucy's latest condition and he told me that he was on his way. I went back to Lucy's room and the nurse told me that Lucy had passed foul smelling loose motions within a couple of minutes of giving the Diazepam suppository. At that time Lucy's respiration became difficult and she stopped breathing. I felt her brachial pulse which was present. I started bagging her effectively. I asked the nurses to attach cardiac as well as pulse oximeter monitor. Within 2-3 minutes of institution of respiratory support Dr O'Donohoe arrived and took over the management.



SPERRIN LAKELAND IS A HEALTH AND SOCIAL SERVICES TRUST

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ESTABLISHED UNDER ACT 14 OF 1995 HEALTH AND PERSONAL SOCIAL SERVICES (N.I.) ORDER 1994

006-001-110



ERNE HOSPITAL
ENNISKILLEN, CO. FERMANAGH, BT74 6AY. TELEPHONE [REDACTED] FACSIMILE [REDACTED]

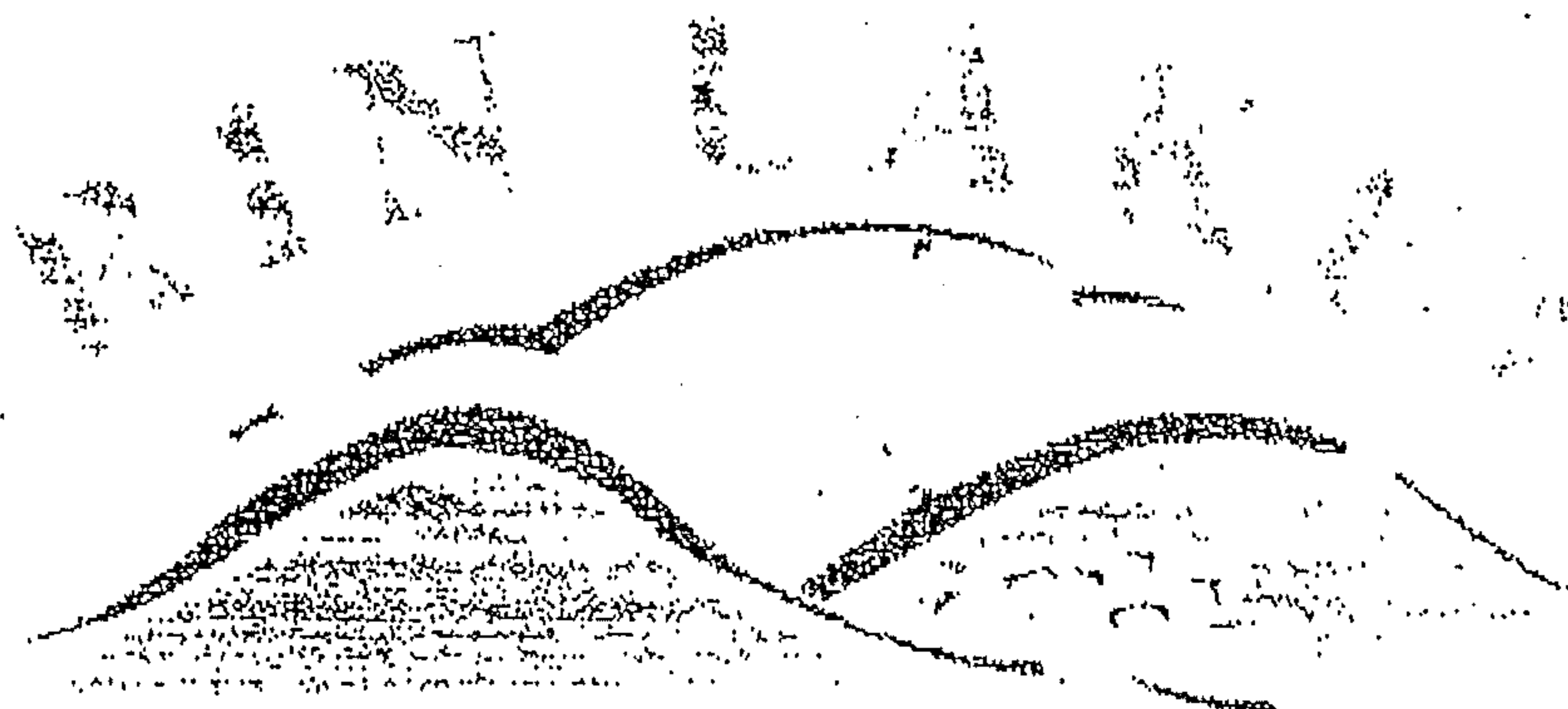
Lucy was intubated by the Consultant Anaesthetist and was moved to ICU at 0445, with a view to be transferred to Paediatric ICU at Royal Belfast Hospital for Sick Children by Dr O'Donohoe.

Yours sincerely

Amerullah Malik

Dr A Malik
SHO in Paediatrics

cc Dr T Anderson, Clinical Director for Obs/Cynae/Paeds



DHSSPS

11/03/03 00:50 FAX

Received pursuant to Rule 17



ERNE HOSPITAL
ENNISSKILLEN, CO. TIRMANAGH, BT74 9AY. TELEPHONE [REDACTED] FACSIMILE [REDACTED]

Mr Kevin Doherty,
Westport Business Services,
Fax No: 71 864 326

re: Lucy Crawford, Erne Hospital Number : 123000

I was called to see Lucy on the day of admission by the SHO on duty (Dr Malik) because he was unable to site a drip. Lucy had been admitted with a history of vomiting and drowsiness. On examination she was sleepy but rousable. Since blood had been sent for urea and electrolyte measurements. I applied local anaesthetic cream to the areas where I thought I was most likely to be able to insert an IV cannula. In the meantime I gave her a bottle of fluid which she took well.

When the local anaesthetic cream had had time to take effect I inserted a cannula. While stripping the cannula in situ I saw Dr Malik writing as I was describing the fluid regime ie. 100 mls as a bolus over the first hour and then 30 mls per hour. The 100 mls was approximately 10 ml/Kg and to cover the possibility that the cannula might not last very long and the succeeding rate was relatively slow since I had seen her taking oral fluid well and presumed the rate of fluid need was relatively small. The intravenous fluid used was saline 0.18% saline;

I looked into the treatment room a few minutes later and Lucy was standing on the couch in front of her mother and looking better.

I was next called at approximately 03.00 because Lucy had had what sounded like a convulsion. My initial presumption was that this was a febrile convulsion. However since she showed no signs of recovering by the time I arrived and since there was a history of profuse diarrhoea I took a specimen for repeat urea and electrolytes. My recollection is that Dr Malik had started the intravenous normal saline before calling me and that the 500 mls given was virtually complete before I arrived. Her repeat urea and electrolytes measurement showed the sodium had fallen to 127. When I took over bagging from Dr Malik it was clear that there was no respiratory effort and her pupils were fixed and dilated. I continued bagging until Dr Amerson (anaesthetist) arrived and he intubated her and she was transferred to ICU.

I arranged transfer to the Paediatric Intensive Care Unit in the Royal Belfast Hospital for Sick Children and since there was no anaesthetist to travel with her I accompanied. I was unable to make a diagnosis for her deterioration prior to transfer. She was hand bagged until arrival in Belfast either by myself or the accompanying nurse from ICU. The only problem in transit was a fall in her blood pressure towards the end of the journey at which point I started a dopamine infusion.

Sincerely,

Dr J M O'Donoghue

DHSSPS

MEDICAL REPORT regarding LUCY CRAWFORD (Deceased)

Strictly Private and Confidential

Date of birth: 05.11.1998

Date of report: 6.02.2004

Date of death: 14.04.2000

This report is based on material made available including hospital notes relating to admission of this child to Erne Hospital in November 1999 and April 2000. The first admission was for bronchiolitis and is not directly relevant to the problems which occurred during the subsequent admission in April 2000. At that time Lucy was admitted to hospital with a history of fever and vomiting for 36 hours associated with drowsiness for 12 hours. There was no history of cough and her chest was clear on examination. The history and clinical findings had been thought by the GP to suggest urinary tract infection but it was felt on admission that this was more likely to be a viral illness. Initial blood tests were performed and Dr Malik attempted to commence IV fluids but was unable to do so and so called Dr O'Donohoe (the Consultant Paediatrician). IV fluids were then commenced. The nursing notes record observations at 19.30, 22.30 and 23.30 during which time the high temperature gradually came down to 37.4.

There is then a gap in the observation sheet with no apparent entry until an episode of sudden collapse which occurred around 3.00 am. It appears that mother called nursing staff as Lucy had passed diarrhoea and then become rigid. Dr Malik was called and felt that this could be a febrile convulsion so administered Diazepam. He discussed the case with Dr O'Donohoe who then came directly to hospital arriving at 3.20 am. At around this time Lucy's condition further deteriorated as she stopped breathing and required respiratory support. The on-call Anaesthetist was called at 3.40 am and Dr Auterson arrived shortly after 3.50 am and assisted with the resuscitation including intubation and transfer to the Intensive Care Unit prior to stabilisation and transfer to the Paediatric Intensive Care Unit in the Royal Belfast Hospital for Sick Children later on the same morning. The doctors involved seem clear that there was no episode of cardiac arrest or circulatory instability during this period but it was noted that the pupils became fixed and dilated and did not respond to ventilation or the administration of Mannitol.

Subsequently tests in Belfast revealed evidence of brain stem death and post mortem examination was performed. This showed bronchopneumonia and cerebral oedema with evidence of herniation of the brain. The Pathologist is unable to comment as to whether the bronchopneumonia had been present from admission to Erne Hospital or had occurred in association with the collapse and resuscitation. Further specimens have shown rotavirus infection suggesting that the initial admission was likely to be due to rotavirus gastroenteritis. Urine cultures showed no significant growth.

DHSSPS

006-001-113

MEDICAL REPORT regarding LUCY CRAWFORD (Deceased)

Strictly Private and Confidential

Comment

This child's admission to Erne Hospital was very typical of gastroenteritis in this age group. This is often associated with high temperature and vomiting with or without diarrhoea and young children can become very unwell. The standard treatment is to administer fluids either orally or (if there is significant dehydration or vomiting) by the intravenous route. The solution used is one which is commonly used in Paediatric practice to provide **maintenance** fluids in these circumstances as it replaces small amounts of electrolytes but also gives Dextrose which is required by young children who are unable to take calories orally during the acute phase of the illness. Initial physical findings were suggestive of poor peripheral circulation with delayed capillary refill time >2 seconds. The GP noted that the mucosae were moist but there is little specific detail in the admission note regarding evidence of dehydration. However, the urea was 9.9 which is slightly elevated suggesting a mild degree of dehydration but with normal electrolytes at that time. This would again be very typical of the condition and would not normally indicate anything other than appropriate fluid replacement with careful monitoring and nursing observation. However, in this situation the intravenous fluids for **replacement of any losses** should contain a higher content of sodium (eg "normal saline" - 0.9% NaCl - sodium chloride).

In these circumstances it is always very difficult to understand an episode of sudden collapse. Sudden onset of convulsions is most commonly due to high temperature in young children and this was considered. However, the features were not typical and the temperature had in fact improved since admission. It is unclear as to what alternative diagnoses were considered at this time but the blood test for electrolytes was appropriately repeated immediately. This showed a significant fall in sodium from 137 to 127 and in potassium from 4.1 to 2.5, together with an increase in glucose from 4.5 to 10.9. These changes do raise the question as to the fluid management in the period from insertion of the IV line at 23.00 to the collapse at around 3.00 am. Unfortunately there appears to have been confusion between the staff involved as to the fluid regime ordered by the Consultant. In addition it is difficult to interpret the records made by nurses on the fluid balance chart and no totals have been calculated for this period. It will be most important to determine from the staff involved **exactly how much of each type of fluid** was given at each stage throughout this time period, and following the change of fluids to normal saline through until the child arrived in the Paediatric Intensive Care Unit in Belfast.

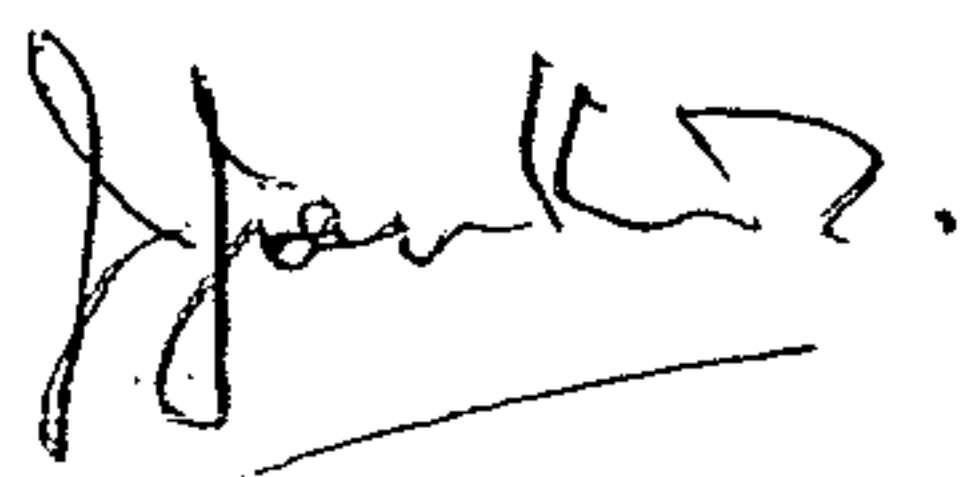
Other aspects of this tragic case demonstrate a rapid and effective response by the medical staff concerned. In particular both the Consultant Paediatrician and Consultant Anaesthetist appear to have been available within a very short time period of being called and to have done their best in the difficult circumstances involved in caring for a child of this age in an adult intensive care setting for stabilisation and transfer in the absence of a Paediatric transfer service in Northern Ireland.

MEDICAL REPORT regarding LUCY CRAWFORD (Deceased)

Strictly Private and Confidential

Over recent years concerns have increasingly been expressed regarding the use of 0.18% saline in Dextrose as a standard solution for intravenous use in young children, and a number of cases of symptomatic hyponatraemia have been identified, some resulting in death or cerebral damage. It has been suggested that a more appropriate solution would contain a higher level of sodium and this has recently been the subject of discussions involving the Department of Health, Social Services and Public Safety and production of guidelines. However, it must be emphasised that this is a recent development and that at the time of Lucy's admission to hospital many Paediatric Units were continuing to use the solution which was initially given in this case. Although the sodium level of 127 is not in itself usually associated with severe problems, it is likely to be the rate at which the sodium falls rather than the absolute level which can cause problems in this setting.

While no definite conclusions can be drawn regarding the cause of this child's deterioration and subsequent death, there is certainly a suggestion that this was associated with a rapid fall in sodium associated with intravenous fluid administration causing hyponatraemia and cerebral oedema. In these circumstances clear documentation is needed regarding the fluid type and rate prescribed, together with clear records as to the exact volumes of each fluid which were in fact received by the child throughout the time period concerned.



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